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*** *The above List is prepared from the Patent Records by Mr. T. Morgan, Secretary of the Inventors' Patentright Association, Limited.*

THE diamond making process of Mr. Hannay seems to be indicated in his paper "On the Solubility of Solids in Gases" read before the Royal Society, in which he states that during his experiments he noticed a curious re-action, viz., when a gas containing carbonated hydrogen is heated under pressure in presence of certain metals the hydrogen is attracted by the metal, and the carbon is left free. When this takes place in the presence of a stable compound containing nitrogen, the whole being near a red heat, and under thousands of atmospheric pressure, the carbon is so acted upon that the clear transparent form of the diamond is obtained.

Reviews.

BLAIR ON BUILDING MATERIALS OF OTAGO.

"The Building Materials of Otago and South New Zealand Generally." By W. N. Blair, Memb. Inst. C.E. Papers originally read at the Otago Institute. Revised and Extended. Dunedin: J. Wilkie and Co., Princes-street.

This work is an exemplar of the fact that the colonial portions of the British dominions are making great strides in regard to the development of material wealth, and that they are doing so with the assistance of scientific intelligence equal to anything that we have in operation in what may for distinction sake be termed the Home-land. Mr. Blair has, it appears, been engaged in the conduct of various public works in the colony of New Zealand, and states that during the progress of the public works under his charge, he had frequently been at a loss to know what material was best suited for the work in hand, and to what uses the local materials could be best applied. There were also frequent differences of opinions as to the identity of many articles, and continual differences as to their properties. This led him to collect and note any authentic information on the subject he met with. These notes grew into the papers originally read at the Otago Institute, and the papers have in turn expanded into the volume now published. If it is found to contribute in the slightest degree towards the development of the natural resources of the colony, he adds—"I shall be amply rewarded for any trouble it has cost me."

The work is very carefully written, and shows that the building materials to be found in the colony are quite worthy of being placed in comparison with those of Great Britain. Under various heads Mr. Blair affords detailed information as to stone, bricks, concrete, and roofing slates, and their geographical distribution; and particularises the hardstones, such as true granite, syenite, pegmatite, metamorphic rocks, volcanic and trap rocks, varieties, basalts, bluestone, greenstone, dolerite, phonolite, timarzite, breccias and trachytes; also as to freestones, bricks, and concrete, with comparison of various building materials, their strength and cost. In Section II. limes, cements, and their aggregates, are brought under notice, and analyses are given. Rich limes, poor limes, and hydraulic limes—such as those of Oamaru, Peninsula and Lower Harbour, Auckland, Taranaki, and Canterbury—receive careful consideration. Hydraulic cements, artificial cements, aggregates, and their cost are duly brought under notice. In regard to timbers, the properties of timbers, structure, growth, felling, qualities, seasoning, decay and preservation are treated of. The hard woods, such as black mapuas, turpentine, red mapua, white mapua, manuka and rata, kowhai, fuschia, broadleaf, kamai, pokakos, ribbon woods, and grass trees receive much attention, as do the soft woods. The metals, viz., iron, copper, lead, and tin are not forgotten, and the work closes with a useful index.

METCALFE ON HOT-AIR BATHS.

"Hot-Air *versus* Hot-Water Baths for the Working Classes." By Richard Metcalfe. London: National Temperance League, 337, Strand.

This sixpenny pamphlet, which is in the form of a letter to the Commissioners of Baths and Washhouses of England, under Act of Parliament, 9 and 10 Vict., cap. 74, treats of the advantages of the hot-air, or Turkish, bath, over hot-water baths, more particularly as regards working people, though parity of reasoning will shew that such baths should be much to the advantage of all classes of the community. The work contrasts the effects of the hot-water and the hot-air bath in very decided terms as the following quotation will prove:—

Warm water bathing is especially unsuited to those who are exposed to unhealthy occupation or fatigue from bodily labour. The sensation of warmth received from the heated water is grateful, I admit, but this feeling soon begins to subside with the falling temperature of the bath, and is followed by an acute sense of discomfort and chilliness, which can only be relieved by a renewed supply of hot-water. This process must be continued while the bather remains in the bath, and such repeated changes of temperature—water being the medium—are attended with discomfort, and at times unpleasant consequences.

But the great objection to the warm water bath, as adapted for general use by working men, is its relaxing effect. Instead of being tonic and bracing, and exciting feelings of cheerful and vigorous buoyancy—which is what working men require—it has a decided tendency to induce lassitude, untune the system, and render it highly susceptible to the influences of cold.

In every respect the hot-air bath produces a totally different effect. It is decidedly tonic and bracing. It elevates the spirits, and excites a pleasurable sense of exhilaration and buoyancy, while it so strongly invigorates the system, and fortifies it against the influences of cold, that bathers may leave the hot rooms, reeking with perspiration, plunge into the coldest water, or roll in snow, without the slightest apprehension of injurious consequences from a chill.

In fact, as every one knows who has indulged in the luxury of the cold plunge, after having passed through the process of the hot-air bath, the rapid transition from the extreme heat of the one to the extreme cold of the other is most enjoyable, and fraught with no danger whatever. The effect is highly tonic, and the very reverse of the fatigue and lassitude caused by warm water bathing, while there is no susceptibility to cold induced. To catch cold, indeed, is impossible, for, as Erasmus Wilson, one of the ablest writers on the subject says, "the bath properly conducted cannot give cold." In truth, it is one of the great recommendations of this form of bath as peculiarly suitable to the condition of the working man, that by no other means can the human body be so well fortified against the injurious effects of cold.

Dr. Armstrong has observed that "the fatigue from a hot-water bath is frequently fatal," while at the same time he bears his testimony that "the hot-air bath does not fatigue." Surely no more need be said in proof of the immense superiority of hot air, in comparison with warm water, as a bathing medium, for is it not self-evident that a mode of bathing that produces fatigue, relaxes the system, causes an enervating lassitude, and induces an unatural susceptibility to atmospheric changes, cannot with any semblance of reason be considered as adapted for general use, much less as calculated to prove beneficial in the case of working men?

If we now consider for a moment the contrast between hot air and water when employed for purposes of healthful recreation and cleanliness, for which bathing is resorted to by the public generally, the immeasurable advantages of hot-air will become more apparent. Both water and air act directly on the skin, but in ways essentially different, and with results equally so.

The only possible effect of a warm bath is surface cleanliness, the dead epidermis which impedes the action of the skin is only very partially, if at all, removed, the internal organs are not acted on directly or indirectly to any appreciable extent. It is evident, therefore, that such a bath is not calculated to afford much relief to the skin in the performance of its functions, the most sensible benefit derived from such a process is but the temporary sensation of surface cleanliness.

With the hot-air bath the effect is very different, the immediate action on the skin is at once stimulating and soothing. Perspiration is gently excited without bodily fatigue, and poisonous impurities are rapidly exuded through the twenty-eight miles of tubing that compose the cutaneous perspiratory system of an ordinary sized man; while simultaneously a genial exhilarating influence is diffused over the whole body.

In this way the skin is assisted in the performance of its vital functions, and the whole organism is benefited both in a medical and sanitary point of view. Not only are the apertures of the pore-tubes opened and freed from the encumbrance of dead skin, but the tubes themselves are flushed, as it were, throughout, and this highly sanitive action is materially increased by the stimulus given to the skin secretions, and it can also be further facilitated by drinking cold water copiously, for which a healthful and pleasurable desire is at the same time created.

Thus the conclusion which science and experience warrant respecting the comparative merits of hot-water and hot-air baths is that for all purposes, sanative, sanitary, and recreative, hot air is incomparably superior to hot baths.

We shall not take upon ourselves the responsibility of giving an opinion on the subject of the pamphlet, but shall be content to leave the matter to the careful consideration of our readers.

WATER SUPPLY.

"Our Water Supply." A Discussion for and against the Fitness of Thames and River Water for Domestic Use. London: Printed by W. Trounce, 10, Gough-square, Fleet-street. 1880.

The subject-matter of this work is of such an important character that we have much pleasure in introducing it to the notice of our readers, for we thoroughly agree with its author that the fitness of Thames and river water for domestic use, are worthy the close attention of the inhabitants of London, and the following quotation tends to show that this question is really momentous:—

In spite of certificates of purity from the companies' chemists, it is a matter of history that in 1853-4, as many as three thousand four hundred and seventy-six tenants of the Southwark and Vauxhall Company—a company which then distributed water from the Thames at Battersea—were officially reported to have died of cholera; and, out of this number, Mr. John Simon, the medical officer of the then General Board of Health, reported to the President, on the 13th May, 1856, "that of the 3,476 persons, tenants of the Southwark and Vauxhall Company, who died of cholera in 1853-4, two-thirds would have escaped if their water supply had been like their neighbours; and that, of the much larger number—tenants of both the Lambeth and the Southwark and Vauxhall companies—who died in 1848-9, also two-thirds would have escaped, if the Metropolis Water Act of 1852 had but been enacted a few years earlier."

The Act of Parliament referred to was passed to prevent the companies taking water, after August, 1855, for the supply of London, from the Thames below Teddington Lock. Instead of the companies, however, resorting to those enormous supplies of pure water so readily and so cheaply to be obtained at a high level from the chalk strata surrounding London, as was strongly recommended at the time by the Government Commission, consisting of the late eminent Professors Graham and Miller, and Professors Hoffmann, the companies insisted upon still resorting to the river above Teddington Lock, notwithstanding it had been demonstrated before the Select Committee of the House of Commons, in 1852, by irrefutable evidence given by the promoters of the Bill of the London (Watford) Spring-water Company, that the water above Teddington Lock, though less contaminated than below the lock, was still too impure for domestic use. Yet, at the present time, as will be seen by the following correspondence, men well-informed on other subjects are to be found who, trusting to the statements of certain analytical chemists, assert that the water above Teddington Lock is quite innoxious, as, in 1849, the chairman of the two water companies above referred to declared it to be below the lock at Kew and Battersea.

For instance, Dr. Meymott Tidy, M.B., M.S., F.C.S., unhesitatingly states, in 1878, in a report addressed to the Society of Medical Officers of Health, "Although I have most diligently considered and compared the death-rates, and also, as far as possible, the causes of death, of different parts of the metropolis, supplied by the Thames water, the Lea water, and the water from the chalk wells of the Kent Company respectively, I have failed to discover any differences worth noting in the death-rates, or any evidence whatsoever that any special class of disease has been prevalent from drinking waters of the Thames and Lea, or absent from the use of the chalk water." No doubt, on similar authority (?), Sir Edmund Beckett, Bart., Q.C., leader of the Parliamentary Bar, and the retained advocate of the London water companies, did not hesitate to write to the *Times* a letter, published on the 10th of January, 1876, to the purport that those who complain of the quality of Thames water "have never traced the smallest degree of illness in London to the drinking of the water now supplied from either the Thames or the Lea."

The same wrongheadedness that characterises the avowal of the chairman of the two water companies in 1849 is found in the avowal of the learned counsel for the companies in 1876. In the weekly return of births and deaths in London and twenty-two other large towns of the United Kingdom, published by authority of the Registrar-General, for week ending Saturday, July 20th, 1878, the following revelations will be found:—"In London, the high mortality of the week is due to diarrhœa, which becomes fatal in London when the temperature of the Thames rises much above 60 deg. Thus, the Thames temperature, which had been 60 deg., rose in the last week of June to 65 deg.; in the three following weeks, it was 68 deg., 66 deg., and 67 deg. The weekly deaths from diarrhœa and simple cholera, which had been 23, rose to 78, 156, 256, and 349 in the corresponding weeks. The deaths from diarrhœa are differently distributed in the fields of the water companies. Thus, the deaths in the last four weeks were 786 in the districts supplied with Thames and Lea waters, whereas the deaths in the districts supplied with water drawn from the chalk by the Kent Company were 19. Out of the same population, the deaths in the former were to the deaths in the latter as 3 to 1."

In the issue for the following week, ending July 27th, 1878, will be found—"The deaths referred to diarrhœa and simple cholera, which in the five precedings weeks had rapidly increased from 22 to 349, further rose last week to 457, of which 336 were of infants under one year of age, and 99 of children aged between one and five years." . . . . "During the past five weeks, the annual death-rate from diarrhœa within the area supplied by the Kent Water Company from deep wells in the chalk, has been equal to 1·7 per 1000; whereas, in the rest of the metropolis supplied by the other companies with water from the River Thames and Lea, the diarrhœa rate averaged 3·7 per 1000."

Notwithstanding these deplorable and frightful facts, pointed out by so competent and independent an authority as the Registrar-General, and without any consideration for the desires or wishes of the great mass of the inhabitants of London, the water consumers—who for many years past have suffered illness and premature death from being, against their will, obliged to drink polluted Thames and Lea river water—and not only so, but, as years passed on since 1854, have had to keep on paying a higher and higher monopoly price—are now threatened with a Government project to compel them to buy up for a monstrous sum, and to become the proprietors of, the existing works, whose chief value consists in the close monopoly the directors have contrived to obtain from the Legislature.

The total expenditure of the eight water companies, from their establishment up to the 30th of September, 1878, is seen in a return made by an order of the Honourable the House of Commons in the past year; in round figures it amounts to £12,100,000. Competent authorities state that, including the sum to be paid to the companies for forced (?) sale, the cost of the purchase to the ratepayers will exceed twenty-eight millions.

Should the intended purchase of these effete works take place, neither the quality of the water as now supplied, nor the mode of supply will thereby in any degree be bettered. Neither is it likely that the working expenses can be appreciably lessened by any new body that may be appointed to perform the functions of the companies, notwithstanding the totally unreliable and loudly-asserted statements to the contrary. In order to improve the mode of distribution, and to get rid of the necessity of still supplying to London the enormous volume of Thames and Lea water that the Registrar-General has reported in certain warm seasons to be infected, another large outlay, probably five or six millions, will be needed; so that, under the proposed arrangement, if the quality is to be bettered, the total cost to the consumers of water—*i.e.*, the ratepayers—is not likely to be less than from 33 to 34 million pounds sterling.

At the present time, competing works, of the best design and construction, including entirely new distributing mains and service-pipes, for the supply of all London and the suburbs served by the existing companies, could be constructed for ten millions. For this sum a constant supply, at high pressure, of pure, softened spring water, derived from unpolluted subterranean sources could be had. Will the ratepayers and water consumers of London be satisfied to saddle themselves, and their posterity, with the payment of 33 or 34 more, millions, when their object can be better attained at an outlay of ten millions, or less? If not, they must bestir themselves betimes, for it is confidently stated that a Government department and the eight companies that supply London have made a compact, the latter to sell at a monopoly price, the other to get the ratepayers to purchase the existing obsolete works, and thus, for ever, saddle the ratepayers with an outlay of twenty-four millions, and, in consequence, debar competing companies from being able to to furnish London with supplies of pure, softened, spring water, on a better and more efficient system, at their own risk, at one-half the charges now enforced by all the present companies for their water, by far the larger volume of which is river water that has been unavoidably mixed with much liquid fœcal and other noxious matter, and which must, as the population increases, be ever more and more contaminated. Even now, as shown by the able and impartial returns of the Registrar-General, this water is infected in hot seasons—the very time when drinking water is in most request by young and old.

Many other important characteristics of river and softened spring will be found discussed in the letters, which, it may be right to state, were originally published in the *Surrey Comet*.

For ourselves, we can only say that although the author is perpaps too hard upon the water companies whose governing bodies are doubtless composed of honourable men, yet the arguments put forward are so cogent that we think every one will do well to carefully consider them.

AURIFEROUS QUARTZ OF SOUTHERN INDIA.

"Notes of a Journey to the Auriferous Quartz Regions of Southern India, with Facts Relating Thereto." By A. HAY ANDERSON. Edinburgh and London: William Blackwood and Sons. 1880.

THE attention of newspaper readers is every now and then given to paragraphs from, or in, Indian and other papers, notices—generally short, and as generally, apparently, somewhat visionary—about quartz-reefs, gold-mining, &c. We read of wonderful reports by mining engineers and others, notices by the Madras Government, or from the Madras Government *Gazette*, with apparently wild reports as to the yield of mineral veins in one particular district of the Wynaad; of the Duke of Buckingham's visit to that district, and of his ideas of "the brilliant future" for that portion of the Presidency at least; we hear of a company to work one block of land there, and to divide with Nicol and Co.'s liquidators cent. per cent. of the vast anticipated profits (sending strong gleams of hope into the hearts of City of Glasgow Bank shareholders), and now of a second company to work on adjoining land. We are glad to be able to give some facts regarding those regions, as well as about other—and we believe richer—reefs and regions in the Mysore province, considerably further north than the Wynaad. Walking along Princes-street or along the Strand to-day, within four weeks we could be, hammer in hand, pounding a piece of quartz at a Wynaad reef or on the Colar gold-fields. The latter are the more easily got at, as, landing at Bombay, rail can at once be taken for Madras. The mail-train starts at 2 p.m. At Colar, says Mr. Hay Anderson, 40 miles from Bangalore, we get almost at once to the auriferous quartz regions—the regions where the pioneers of Indian gold-mining have been for years prospecting and working, developing slowly but surely the resources and riches of that district.

To continue in the words of our author: We confine ourselves first to a bare statement of facts, of stone actually got, reefs actually seen and prospected over, and actual results. One reef in this district has been more thoroughly tested than others: from 9 tons of stone taken out at 80 feet depth, 27½ oz. of gold were got; stone taken out at another part, and at 18 feet depth, gave at the rate of 1 oz. 3 dwt. per ton; and at 50 feet depth, 4 oz. 13 dwt. per ton. From that reef, and near the portion last tested, some 300 to 400 tons of stone are now ready waiting the arrival of stamping and amalgamating machinery from Australia. The stone is a dark-grey quartz, the gold in it is in very fine particles, and is diffused throughout. We can well imagine that within a year or two, mine after mine, and company after company, will be busy at work all over that district. Capital and machinery are essential there as well as in Wynaad.

The work proceeds with a graphic recital of the journeyings of the author, who, visiting the particular spots where mining is being done, breaking off and breaking up pieces from those reefs, and seeing the gold in it, many pieces, and all the samples shown looking far richer than the grey vein-stone of Colar. The Madras Government *Gazette* of September last gives the report of the Government mining engineer, corroborating other reports previously published. It states the results of tests of parcels of stone taken from different parts of one reef :—

Lot		oz.	dwt.	
No. 1.	No gold visible ..	0	11	Per ton, we omit the grains.
No. 2.	No gold visible ..	2	16	
No. 3.	A little gold visible	56	13	
No. 4.	Gold visible.. ..	204	11	

Travelling more about, and further on in the Wynaad district, many ancient workings are seen, where the stone had outcropped and gold been visible, it had always been followed down so far—all hand-labour, sinking, pounding, washing ; but reef after reef has never been touched at all, all waiting exploration. The district is about 150 miles south-west of Bangalore, and due east from Calicut. Many reefs extend to, at least show, near the summit of the Ghauts, within thirty miles of the coast, and approachable from Calicut going to South Wynaad, from Tellicherry to North Wynaad. A letter, dated 31st October last, written by an associate of the Royal School of Mines, who, on account of Messrs. Nicol and Co., visited the district some eighteen months ago, says :—"From the vast extent of work done by the ancients, corroborated by the fact that the surrounding jungles to this day contain wild elephants, apes, and peacocks, also aromatic trees and plants, I had no hesitation in designating this locality as the veritable 'Ophir' of Scripture. . . . I am more strongly impressed with that view than ever."

We have to omit the various incidents of travel narrated in this pamphlet, which concludes as follows :—It had been ascertained three or four years ago—stories and accounts heard years before that, at first partaking of the legendary and indefinite, then with more substantiality as more was heard and known, and visits were paid to the districts—how much had long since been done, and how much may, and can, now be done with regard to these quartz regions and gold-bearing reefs ; and now, during these three or four years, more and more work has been done, reefs have been traced and examined, the country demarcated, plans made, leases (as well as grants) been obtained from Government, arrangements completed with landowners and landholders (a complicated and not an easy matter), and reports on the quartz have been got in India, in Australia, and at home. We had now satisfied ourselves that gold is there, and is obtainable with even less difficulty and at less cost than at the Australian and Californian mines ; and not only that, but that it is there in no mean or meagre quantity. We next proceeded to see the ground, and the one reef in particular, which traverses that portion of the land longitudinally, running nearly due north and south for over three miles.

To go from the traveller's or visitor's account to the geologist's :—The reef in question curves here and there, and dips from east to west, and is intersected frequently by spurs of quartz diverging from the main reef or its different veins. The underlying strata of schist rests on trap-rock. The quartz is mostly of a grey granitic appearance, though in some places it is white, partly discoloured with iron, but deeper down again assuming the grey and hornblende appearance.

To go on and blend that geology with further facts. At one place near a small outcrop from the reef in question a shaft was sunk, and at about 50 feet depth a small drive made, from which over nine tons of qurrtz were taken, some of the stone with gold visible in it, some with no appearance of gold at all. Pounding and amalgamating machinery had been erected, and from these nine tons of stone 27½ oz. of gold were obtained, as previously stated. Further on, however, another shaft had been sunk, the reef tapped, and the stone reported "barren ;" water in quantity was come upon in the "drive" first mentioned, large capital seemed necessary, and for a time work was suspended. Now work has been resumed, and is being energetically and successfully proceeded with. The stone declared worthless has been found quite the reverse ; natives had soon carried most of it away or broken it up on the spot, and it actually contained gold to over an ounce per ton. More stone from an adjacent part of the reef has been got up and tested ; and, still further to prove matters, at 15 and 30 feet further on two fresh shafts have been sunk, the one 18 the other 50 feet deep ; and the stone tested at the office of Mr. Brough Smyth, the eminent mineralogist from Australia, now employed by the Government of India specially to aid with these and similar discoveries, was found to contain gold in quantity such as would realise the wildest ideas of quartz-miners. The reef has just been laid bare 100 feet longitudinally, and quartz is being quarried out : it commences at a thickness of 7 feet, and at the foot of the present working is 12 feet thick. It is estimated by high mining authorities that, supposing that one reef to extend to the depth of only 300 feet, to work it so as to obtain—*i.e.*, raise—100 tons per day, it would last for over sixty years. (*Mem.*—In Australia we had seen sinking on reefs, rather with the reefs, to depth of 1000 feet, and know of sinkings, both there and in California, of over 1500 feet.) In this stone the gold is throughout, and even when invisible with a magnifying-glass, no veinstone tested has as yet yielded so low a return as half an ounce per ton. Diggers know what that means, for six pennyweights to the ton clears all cost and leaves a profit.

All the accounts received on the spot and elsewhere, all the geological and other facts here roughly narrated or sketched out are the mere etchings, in pencil as it were, for a landscape in a setting of gold, which will yet materially affect the currency question, and go very far towards settling matters with regard to our Indian exchanges.

An article in the *Gentleman's Magazine* for January, 1880, goes fully into the question as to where the gold—of Ophir traditions—came from : exhausting the historical and other facts, it agrees with the view as given above in extract from letter, and concludes : "It is no idle surmise, but an assumed inference ascertained by an accumulation of facts, that the mines which in former times enriched India with an unparalleled supply of gold, will ere long pour forth a fresh supply. The result, it cannot be doubted, will be to restore our great empire in the East to that flourishing condition which seems of late to have been almost despaired of."

Those who wish further and detailed information on this important subject are requested to apply to 31, St. Bernard's Crescent, Edinburgh, or 14, Hillsborough Square, Glasgow.

ANDERSON ON LIGHTNING CONDUCTORS.

"Lightning Conductors, their History, Nature, and Mode of Application." By Richard Anderson, F.C.S., F.G.S., Member of the Society of Telegraph Engineers. With numerous Illustrations. London: E. and F. N. Spon, 46, Charing-cross; New York: 446, Broome-street.

This is a very elaborate work containing all that need be said about Lightning Conductors. The author, in the preface, thus sets forth the nature and object of the work :—

Though there are English works bearing more or less on lightning protection yet it will be found these books are either obsolete and out of date, or are written in a purely popular style that conveys little or no 'usable' information whereby may be obtained a trustworthy account of the growth and application of the Lightning Conductor.

It is with a view of meeting this need that the present work has been written. It contains not only a history of the various methods that have been used to this end, but also a thoroughly practical exposition of the systems employed by the best authorities in various countries.

To architects, clergymen, municipal officials, and all those in charge of large and lofty buildings, it would be impossible to over-estimate the importance of this subject. Year by year an enormous amount of property is destroyed merely because the simplest precautions have not been taken to guard churches and other large buildings from the effects of thunderstorms.

The author of this work can at all events claim a large practical acquaintance with its subject. He feels convinced that those concerned in the preservation of buildings, whether they be houses, churches, or public offices, need only to learn the simple methods that can be used to render the action of lightning innocuous, in order to adopt them.

The book is divided into chapters, which treat the following as principal points :—Electricity and lightning ; discovery of the lightning conductor ; early experiments with lightning conductors ; metals as conductors of electricity ; character of lightning and of thunderstorms ; inquiries into lightning protection ; the best material for conductors ; Newall's system of protecting buildings ; accidents and fatalities from lightning ; the earth connection ; and inspection of lightning conductors.

IRON AND STEEL AT LOW TEMPERATURES.

By Mr. John James Webster, Assoc. M. Inst. C.E.

The first part of this paper, which was read at a recent meeting of the Institution of Civil Engineers, Mr. W. H. Barlow, F.R.S., President, in the chair, treated of the generally received opinion as to the condition of iron and steel at low temperatures, reference being made to the evidence given before the Royal Commission appointed to inquire into the application of iron to railway structures, and to papers read before the British Association and elsewhere. An account followed of the results of experiments by the late Sir W. Fairbairn ; after which the elaborate series by M. Knut Styffe were mentioned, and the conclusions he arrived at were stated *in extenso*. From the results of these tests as to tensile strains, it appeared that the absolute strength of iron or steel was not influenced by severe cold, but that the ductility of these materials was increased. Mr. C. P. Sandberg had submitted rails of iron and of steel to a force of impact, and his deductions were quoted.

The author then gave an account of the experiments he had made on bars of wrought iron, cast iron, malleable cast iron, Bessemer steel, and best cast tool steel, with a description of the apparatus used, and of the method of conducting the experiments. The bars were tested with tensile and transverse strains, and also by impact ; one half of them at a temperature of 50° Fahrenheit, and the other half at 5° Fahrenheit. The lower temperature was obtained by placing the bars in a freezing mixture, care being taken to keep the bars covered with it during the whole time of the experiments. The results were given in eight tables, and the averages of all in a ninth table. Three sheets of diagrams accompanied the paper ; the first sheet illustrated the testing apparatus, the second and third sheets showed the extensions of the bars at the different portions of their length, the appearance of the fracture, and the percentage of elongation and of reduction of area. The results of the experiments were summarised as follows, viz.:—

1. When bars of wrought iron or steel were submitted to a tensile strain and broken, their strength was not affected by severe cold (5° Fahrenheit), but their ductility was increased about 1 per cent. in iron and 3 per cent. in steel.

2. When bars of cast iron were submitted to a transvere strain at a low temperature, their strength was diminished about 3 per cent. and their flexibility about 16 per cent.

3. When bars of wrought iron, malleable cast iron, steel and ordinary cast iron, were subjected to impact at a temperature of 5° Fahrenheit, the force required to break them, and the extent of their flexibity were reduced as follows, viz.:—

	Reduction of force of impact. per cent.	Reduction of flexibility. per cent.
Wrought iron	about 3	about 18
Steel (best cast tool) ..	,, 3½	,, 17
Malleable cast iron ..	,, 4½	,, 15
Cast iron	,, 21	not taken.

The paper closed with a review of the experiments described, with some remarks on the conclusions arrived at, and with a statement of the opinions formed by different authorities.

A case of samples of the fractured ends of the bars used in the experiments was exhibited.

MOVABLE DAMS IN INDIAN WEIRS.

By R. B. Buckley, Assoc. M. Inst. C.E.

This paper, read at a recent meeting of the Institution of Civil Engineers, commenced with a brief description of Indian weirs, and then proceeded to show the necessity for having portions of these weirs movable, so that the silt and deposits of different kinds might be swept away from the heads of the canals supplied from the rivers above the weirs. A description was given of the form of movable weir which had been adopted on the Mahanuddee and Cossye rivers. The shutters were hinged to a horizontal axis on the floor of the sluice in two rows placed back to back. The upper ones folded up stream and the lower ones folded down stream. The back or down-stream shutters were about 18 inches higher than the front row. When the movable dam was open and the water flowing over it, the front or up-stream shutters were held by hooks to the floor, so that they could not rise. To close the sluices the hooks were released by a bar, which could be manipulated from the pier; the shutters were at the same time slightly lifted by the same bar, and when the stream got under them they were forced upright. Chains, which were attached to the front of the shutters, received the severe blow which was brought on them by the sudden raising of the shutters. The back shutters, as soon as the front ones had been lifted, were raised by hand from the back, and were retained in position by wrought-iron struts behind them. When all the back shutters were up, the lower ones were pushed down on to the floor and fastened with the hooks, and the movable dam was then ready to be opened at any moment. To open the movable dam, the struts of the back shutters were released from the cast-iron shoes in which they rested, by the action of a horizontal bar which lay on the floor. This bar caught the struts one after another, as it was moved by gearing on the pier, and released them; the shutter then fell and the waterway of the sluice was opened.

On the Sone weir the movable part was in three lengths—one at each end, and one at the centre of the weir. Each length consisted of twenty-two shutters, 20 feet 7 inches long by 9 feet inches high. There were two shutters, the front and the back one, between stone piers; the front shutter was hinged horizontally at its heel to the floor. It folded forward—or up stream—into a nearly horizontal position on the floor. Each shutter had on its down-stream side six hydraulic brakes. These impeded the closing of the shutter, and prevented the shock which was so objectionable in the form of movable dam previously described. The brakes were simply formed of a pipe which was hinged to the shutter, and a strut hinged to the floor, the head of which was fitted with hydraulic packing. When the front shutter was lying horizontally the pipe became full of water from the river. In the pipe were three holes 3-16th inch in diameter, through which the water was expelled as the shutter rose. The back shutter was hinged by tension rods on its up-stream face. The rods were hinged at one end to the shutters a few inches below the centre of pressure of the water on the shutter when erect; the other extremities of the rods were hinged in the floor between the two shutters. The shutters, when the water was level with their crests, were on the point of overturning, as they were hinged slightly below their centre of pressure. When the water rose a little above their crests, they did overturn. Chains to prevent them doing so were fitted with let-go gear. As a rule, the back shutters were kept up to retain the water, the front ones being fastened down to the floor. If a flood was expected, the chains of the back shutters were let go, and when the river had risen to a certain height, they opened of their own accord. To close the movable dam, the front shutters were one by one slightly raised by hooks worked by levers from the piers. The stream then impinged below the shutters, and forced them up into the vertical position. The hydraulic brakes decreased the velocity with which the shutter would ascend, and relieved the piers and masonry from shock. When the front shutters had been raised, the back ones were pulled up by hand, and the front ones were put back into their horizontal position on the floor. Some improvements in this form of weir were suggested. As the action of the movable dams of the Sone weir had not been found sufficiently powerful to keep a channel clear for navigation, a row of shutters, similar in principle to the back shutters, but only 2 feet 3 inches high, was to be placed all along the crest of the weirs, which were 2½ miles long. The paper described briefly a system of double-tumbler shutters, which had been proposed by Mr. Fouracres, who introduced the system of the Sone weir, but which had not been as yet adopted in practice.

SONG.

I ask not a thought in your bright days of gladness,
I ask not a glance from your path on my sadness;
Yet let the past fire of my influence rest
On the heart which once craved to be clasped to my breast.

Let your love be all mine in this pure world of sleep,
And my soul shall know peace at last ceasing to weep;
Nor grieve when the angel of dreams shall declare
Such rupture must wake to life's blankest despair.

V. Gonville.

An improvement in plates for holding screw-cutting dies has been patented by Mr. John G. Geiser, of Fort Clark, Brackettville, Texas. This invention relates to hand plates for holding screw-cutting taps and dies. It consists in certain novel features by which screw threads may be more conveniently cut than heretofore, and whereby left hand taps may be formed from blanks by right hand screw-cutting devices.

THE LAW OF COMPENSATION.

Outside the gate of Dives' house,
Upon the hard, cold ground
Lay Lazarus, the leper poor,
His couch a grassy mound.
He listened to the joyous songs
And strains of minstrelsy,
For through the air were wafted wide
The sounds of revelry.

Compassion filled his heart for those
Within the palace walls,
For when, thought he, would they attain
The everlasting halls?
Thus quietly he passed his days
In patience at the gate,
Preparing for the change to come
To end his weary fate.

For though he was by Dives seen
Suppliant for relief,
Yet not a thought the rich man gave
To soothe another's grief.
At length the days of mourning ceased;
The leper passed away
To where the presence of the Lord
Creates eternal day.

. . . . . .

While safe in Abram's bosom laid
The rich man he beheld,
Whose narrow, earth-bound soul in chains
Of discipline was quelled.
Then spake he out to Abraham,
"Send Lazarus, I pray,
To cool this ceaseless agony,
Whose cause is need of day.

For all is darkness in this place,
And everything is night;"
(For such are vice and wickedness
Compared to in God's sight).
Then spake the guide of Lazarus
In accents firm yet kind:
"Thou, Dives, when on earth, wast rich
In all that earth could find.
But Lazarus—poor, wretched, lame—
Thou didst not clothe or feed,
Nor didst thou visit in thy life
Those in distress and need.
And now he who in tears that sowed
Shall reap in peace and joy;
Thou also retribution hast
Which nothing can alloy!"

A. B.

SAHLSTROM ISINGLASS.

This invention is to manufacture isinglass, gelatine, and glue from fish offal.

The fish or fish parts are first soaked well in water, they are then left some three or four hours in a water solution of chloride of lime (say 16 of water to 1 of chloride of lime); the material is then rinsed and treated for about 20 or 30 minutes with a solution of about 300 parts water and 1 part of supermanganate of alkali; it is then exposed to the action of nitrous acid vapours generated through heating of about a quarter cubic foot of concentrated nitric acid for every hundred-weight of material.

The sulphurous acid may be first absorbed by the water as is used in the manufacture of sugar for purifying the syrup. The material is then rinsed, and all skin parts are removed which are to be made into isinglass; the rest is dried with a slow heat and pressed.

The parts destined for gelatine and glue are for a space of about 10 or 12 hours exposed to a temperature of about 100° or 120° F.; most of it is then small and is strained; after standing some hours it is dried as ordinary gelatine and glue.

Instead of the nitrous acid sulphurous acid may be used, which is generated by burning about half a pound of sulphur for every hundred-weight of material.

Mr. James W. Smith, of South Schroon, N.Y., has patented an improved washing machine, which is so constructed as to wash the clothes quickly and thoroughly, and to allow any desired part of the clothes to be ubbed more or less as may be required.

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President, SIR ANTONIO BRADY.

THE SESSION 1879—1880

Members' Meetings will be held at 8.15 p.m. on Thursdays, March 11th and 25th; April 8th and 22nd; May 6th; and June 3rd.

On the 11th March, Patent Law Reform Conference.

On 25th March, Exposition of Inventions, and Patent Law Question.

Executive Council Meetings at 7.30, on same evenings as above.

Annual General Meeting, Thursday, May 20th, at 4 p.m., unless otherwise arranged.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts.

F. W. CAMPIN, Sec.

Proceedings of the Institute.

MEMBERS' MEETINGS.

On the 5th February the Patent Law question with reference to proceedings to be taken in the new Session of Parliament, was discussed; but as this was the advent of the new Parliamentary Session, the further consideration of the question was adjourned.

On the 26th February, Mr. James Cadett's paper on "Brilliancy in Lighting, with special reference to the Lime-light, was read and discussed. It was well received by a large meeting; but, in consequence of its being delivered so near the time of our going to press, we have to reserve our report of this meeting.

EXECUTIVE COUNCIL.

At the meeting on 26th February, the resolution as to a special subscription list to meet the expenses of movements to advance Patent Law Reform and other important business of the Institute, was affirmed. The financial position of the Institute was reported as progressive, and after the secretary had stated that Mr. Anderson, M.P., proposed to bring in a Bill for amending the Patent Law similar to that presented to the Legislature last Session, Admiral Selwyn remarked that International Patent Law being now so nearly approached, it would seem undesirable to take up the lesser question; but upon the matter being discussed, it was in effect agreed that it might be desirable to support Mr. Anderson's Bill.

Monthly Notices.

Mr. Crookes, F.R.S., has been awarded an extraordinary prize of 3000 francs by the French Academie des Sciences in recognition of his recent discoveries in molecular physics and radiant matter.

Balmain's "Luminous Paint" has been, we are informed, examined by the Lords of the Admiralty, who are so favourably impressed with it that they have ordered two compartments of H.M.S. *Comus* to be painted with it. At the West India Docks the Superintendent has ordered some phosphorescent lanterns for use in the spirit vaults. We have heard of other applications, but these have not been satisfactory to us, seeing that to render the paint luminous in the dark it must be previously exposed to sunshine or, at all events, to strong daylight.—*Athenæum.*

Mr. Peter Spence gave an important piece of information to the members of the Manchester Geological Society at a recent meeting. He stated that no boiler on his works had been chipped for the last fifteen years. This was simply due to his keeping the water supplied to the boilers alkaline by adding from time to time a little carbonate of soda or soda ash.

Mr. Edward Hearle Rodd died at Penzance on the 25th of January. This amiable gentleman and industrious naturalist, says the *Athenæum*, and we endorse this, cannot be allowed to pass away without some notice. Actively engaged as a partner in one of the most important legal firms in Cornwall, he still found opportunities for making a most valuable ornithological collection. For many years Mr. Rodd was a constant contributor to the pages of Newman's *Zoologist*, and his name will be frequently met with in the volumes of Yarrell and Gould. In 1864 he published a "List of British Birds in the Land's End District." At the time of his decease Mr. Rodd had in the res a work on the birds of Cornwall, which will shortly be published by Messrs. Trübner & Co. The volume will be edited by Mr. J. E. Harting, and will contain a memoir and portrait of the author from a recent photograph. Apart from its value as a guide to the ornithology of Cornwall, the addition of the memoir and portrait should make it an acceptable souvenir to the author's numerous friends.

Prof. Forbes' instrument for detecting fire-damp and determining the quantity of light carburetted hydrogen in the air was described by him at a recent meeting of the Glasgow Philosophical Society. It is called the "damposcope." The construction of it is very simple. Over the mouth of a straight brass tube is fixed a tuning-fork; inside this brass tube slides another tube of the same metal, moved by a regulating screw, so that the compound tube can be lengthened or shortened at will, this movement being registered on a dial. To ascertain the amount of fire damp in the pit, the instrument is taken to the suspected spot, the tuning fork is set vibrating, and the screw turned until the maximum sound is emitted. The index is then read off, and it appears the quantity of gas can be determined to within one half per cent.

The virulent maladies of fowls are described by M. Pasteur in the *Comptes Rendus* of the Academy of Sciences for February 9th. He states that the cholera of fowls may be prevented from becoming fatal by inoculation. M. Pasteur suggests that we should seek the destruction of phylloxera by inoculation of the vine with some microscopic fungus, and he invites the attention of naturalists and others interested in the cultivation of the vine to the subject.

M. Sainte-Claire Deville has resigned the Professorship of Chemistry at the Ecole Normale de Paris, after having occupied that chair for twenty-nine years. Prof. Troost has been appointed his successor.

Dr. Fleming, formerly of Manchester, has just died at his residence in Cheshire at the age of eighty-one. He was one of the most active promoters of the Chetham Society when it was instituted in Manchester in 1843. He was the first Honorary Secretary of the Society, and did much to promote its success. The annual meeting of the Chetham Society is fixed for Wednesday next, March 3rd, at the Chetham Library, Manchester.

The use of the telephone is becoming general. The Corporation of Leeds have formed a telephonic communication between the Town Hall and the waterworks reservoir at Eccup, and between the central gasworks in Meadow Lane, Leeds, and the branch works at New Wortley. It is stated that four hundred telephones have been supplied to the Lancashire and Yorkshire Railway.

The Scientific Review

MARCH, 1880.

DIAMOND MAKING.

Already having the distinguished honour of being associated with the name of James Watt, the inventor of the steam engine of to-day, Glasgow, is, it would seem, determined to be again to the front in the ranks of practical science; and this time the cause of renown is not a grand achievement in physics and mechanics, but a triumph for chemical science. This time it is not a creation of power by what may by way of analogy be called an analytical feat—turning water into effective vapour—but a synthetical one, turning some beggarly elementary constituent into splendid diamonds.

In our last number we noticed the efforts of Mr. Mactear, of Glasgow, to manufacture diamonds, which, it appeared, after strict investigation, were found to have no such splendid result, as Mr. Mactear had not made diamonds at all. Since Mr. Mactear's attempt another distinguished chemist of Glasgow, Mr. Ballantine Hannay, has submitted to Professor Story-Maskelyne "small crystallised particles," made from carbon in his laboratory, as to which the Professor thus writes in the *Times* :—

Sir,—A few weeks since I had to proclaim the failure of one attempt to produce the diamond in a chemical laboratory. To-day I ask a little space in one of your columns in order to announce the entire success of such an attempt by another Glasgow gentleman.

That gentleman is Mr. J. Ballantine Hannay, of Woodbourne, Helensburgh, and Sword-street, Glasgow, a Fellow of the Chemical Society of London, who has to-day sent me some small crystallised particles presenting exactly the appearance of fragments of a broken diamond.

In lustre, in a certain lamellar structure on the surfaces of cleavage, in refractive power, they accorded so closely with that mineral that it seemed hardly rash to proclaim them even at first sight to be diamond. And they satisfy the characteristic tests of that substance. Like the diamond, they are nearly inert in polarised light, and their hardness is such that they easily scored deep grooves in a polished surface of sapphire, which the diamond alone can do. I was able to measure the angle between the cleavage faces of one of them, notwithstanding that the image from one face was too incomplete for a very accurate result. But the mean of the angles so measured on the goniometer was 70deg. 29min., the correct angle on a crystal of the diamond being 70deg. 31·7min. Finally, one of the particles, ignited on a foil of platinum, glowed and gradually disappeared exactly as mineral diamond would do.

There is no doubt whatever that Mr. Hannay has succeeded in solving this problem and removing from the science of chemistry an opprobrium so long adhering to it; for, whereas the larger part of the great volume recording the triumphs of that science is occupied by the chemistry of carbon, this element has never been crystallised by man till Mr. Hannay achieved the triumph which I have the pleasure of recording to-day. His process for effecting this transmutation, hardly less momentous to the arts than to the possessors of a wealth of jewelry, is on the eve of being announced to the Royal Society.—I am, Sir, your obedient servant,
N. Story-Maskelyne.

Mineral Department, British Museum, Feb. 19.

The Royal Society have since the date of Professor Maskelyne's report had this subject under consideration, and nothing seems to have transpired to negative Mr. Hannay's success.

The social, commercial, and industrial effects of the manufacture of diamonds has much exercised the minds of the writers of the public journals, and the *Daily Telegraph*—which, whatever views one may have as to the soundness of its political knowledge, is, without doubt, from its connexions and taste, quite capable of dealing effectively with such subject matter as diamonds and precious stones,—begins a leading article by asking whether the making of diamonds out of charcoal is to be taken as good or evil news? If (says our contemporary) the statement may be believed, and we must certainly reserve our own opinion for the present, thousands of proud possessors of this hitherto unmatched gem have cause to tremble. The bride will glance at the dancing splendours of her marriage gift with tears of wounded pride; the débutante, arming herself for Court in the old family jewels, will feel half her glory vanished; the digger at the diamond fields will mutter savage things about modern science, and dealers from Cape Town to Amsterdam will anathematise chemistry. It is true that the owners and wearers of valuable diamonds may find a considerable crumb of comfort in the fact that Mr. Ballantine Hannay has produced as yet only "small crystallised particles." Perhaps this is his limit; perhaps Nature permits her inquisitive children to play with diamond dust, but still defies them to turn out a Koh-i-noor under less time than a cycle of ages, and with slighter forces than subterranean furnaces and the mighty alembics of the earthquake and the volcano. Still, if only the thing can be effected at all there is no certainty that big stones may not be manufactured by the same process as little ones, and in that case, what a dethronement there will be of the Royal jewels which, now in a hundred capitals, glitter in regalias, and make the pomp and pride of Sovereigns! Is the "Mountain of Light" which her Majesty inherits from the Great Mogul to become the shawl-pin of a milkmaid? Is the sumptuous Braganza diamond of the Emperor of Brazil to save itself only by being declared a white topaz? The Rajah of Mattan owns a stone, oval-shaped and as big as a crow's egg, for which the Governor of Borneo once offered half a million dollars, two war ships, twenty cannon, and any amount of ammunition. The Malays believe that all diseases are cured by drinking water in which this superb gem has been dipped; but what will happen when the little realm learns that its treasure is charcoal and can be excelled out of the end of a burned stick? The Czar has the Orloff diamond, once the eye of an Indian god, and valued at five million roubles, which, if Glasgow can turn out brilliants by the bushel, will not be worth as many copecks. Then there is the Regent stone, which forms the boast of the French regalia, and which was shortly to have been sold in conformity with the decrees of Republican economy. It decorated the sword hilt of the First Napoleon, and stood unrivalled in the whole world for limpidity, flashing radiance, and symmetry. Is it to be eclipsed on a sudden by artificial gems produced by the dozen or the score? The Sanci diamond, which cost the life of Henry III.'s faithful messenger, who swallowed it, and made his dead body its casket; the beautiful blue diamond in the Hope family; the magnificent jewels treasured at the native Indian courts, some of them of wondrous dimensions, and still uncut, for the European lapidaries did not know this art until Van Berguen, of Bruges, learned it from Oriental workers.

If, however, chemistry has really effected this prodigious feat, the world at large will no doubt finally benefit. Beautiful ornaments will be made general, and the demoralising shams known as "paste" and "imitation brilliants" be thrust aside, Diamond dust—one of the most useful commodities of the workshop—will become cheap; and diamond-drills, with which all sorts of excavation and mining work can be easily performed might be universally employed. Even if the upshot of the discovery should only be that our laboratories could produce the small and inferior gems called "Bort" [and a letter from Mr. Hannay, inserted in the *Times*, of the 1st of March, which we give in another column of the Scientific Review, claims success only to this extent], it would be of extreme advantage to procure these for the arts, cheaply and plentifully. Bad for opulent beauty and for the Transvaal diggers, the feat to-day, perhaps, too confidently proclaimed, would be a good thing for trade and manufacture, and disconsolate loveliness might still find refuge in the sapphire, the topaz, and the ruby, the emerald, which science has not yet attacked. Opals are unlucky, and pearls only become certain complexions; but if diamonds ever should indeed grow unfashionable by over supply, there are untouched treasures in the mineral world, such as moonstone and the lovely labradorite. Yet the doubt would then most seriously arise where these audacities of chemistry are to stop. Sated with the creation of old and new organic substances, what if our modern magicians should press forward another step and produce gold? The experiments of Mr. Norman Lockyer go far to show that the idea of primary substances is fallacious, and that matter is practically one under many forms. What if the dream of the old alchemists should some fine day be realised, and some reckless experimentalist should as suddenly announce the transmutation of metals?

Proceedings of Societies.

ROYAL SOCIETY.

Jan. 15th.—The President in the chair.—The following papers were read:—"On Chemical Repulsion," by Dr. E. J. Mills; "Results of an Inquiry into the Periodicity of Rainfall," by Mr. G. M. Whipple; "On the Spectra of Magnesium and Lithium," by Profs. Liveing and Dewar; and "Studies on the Electric Arc," by Prof. Dewar.

Jan. 22nd.—The president in the chair. The following papers were read:—"On Certain Definite Integrals, Nos. VI. and VII.," by Mr. W. H. L. Russell; "On the Construction of a Glycerine Barometer," by Mr. J. B. Jordan; and "On a Possible Mode of detecting a Motion of the Solar System through the Luminiferous Ether," letter by the late J. C. Maxwell.

Jan. 29th.—The president in the chair. The following papers were read:—"English Reproduction Tables," by Dr. W. Farr; "A Note on Protagon," by Prof. Gamgee; "The Induction of Electric Currents in Infinite Plates and Spherical Shells," by Prof. C. Niven; and "On the Physical Constants of Liquid Hydrochloric Acid," by Mr. G. Ansdell.

GEOLOGICAL SOCIETY.

Jan. 7th.—H. C. Sorby, Esq., President, in the chair.—Mr. E. B. Poulton was elected a Fellow; and Prof. A. E. Nordenskiöld, Stockholm, and Prof. F. Zirkel, Leipzig, foreign members. The following communications were read: "On the Portland Rocks of England," by the Rev. J. F. Blake; and "On the Correlation of the Drift-deposits of the North-West of England with those of the Midland and Eastern Counties," by Mr. D. Mackintosh.

Jan. 21st.—H. C. Sorby, Esq., president, in the chair. Mr. R. Bell was elected a Fellow. The following communications were read:—"On the Genus Pleuracanthus, Agass., including the Genera Orthacanthus, Agass., and Goldf., Diplodus, Agass., and Xenacanthus, Beyr," by Mr. J. W. Davis; "On the Schistose Volcanic Rocks occurring on the West of Dartmoor, with some Notes on the Structure of the Brent-Tor Volcano," by Mr. F. Rutley; and "On Mammalian Remains and Tree-trunks in Quaternary Sands at Reading," by Mr. E. B. Poulton.

SOCIETY OF ANTIQUARIES.

Jan. 8th.—The appointment of E. Freshfield, Esq., as Vice-President, in the room of Lord Northesk, resigned, was laid before the meeting. Mr. C. Knight Watson, Secretary, stated he had been instructed by the Council to submit to the meeting, for the information of the society, the following letter from the Foreign Office, in reply to a memorial from the President and Council relating to St. Mark's, Venice:—

"Foreign Office, Dec. 5, 1879.

"My Lord,—I am directed by the Marquis of Salisbury to acknowledge the receipt of your lordship's letter of the 25th ult., in which, as President of the Society of Antiquaries, you call Lord Salisbury's attention to the reported intentions of the Italian Government to restore the west front, or façade, of St. Mark's Venice, and request that his lordship will, through her Majesty's Ambassador at Rome, communicate to the Italian Government the desire of the Society of Antiquaries to be favoured with an authoritative statement of the real facts of the case. I am now to request that your lordship will express to the Council of the Society Lord Salisbury's regret that he is unable to accede to their wishes in this matter, as, upon a due consideration of their request, he cannot but feel that the subject is not one on which her Majesty's Government could with propriety address the Italian Government.—I am, my lord, your lordship's most obedient humble servant,

(Signed) "Tenterden."

The following letter from Lord Carnarvon to the Secretary, date Pixton Park, December 7th, 1879, was also read:—

"Dear Mr. Watson,—I return the official answer. My impression is, looking to all the circumstances of the case, that it should be read to the Council, and that, if they think it desirable, it should be read to the following ordinary meeting. I do not think that we should do more than this. One great object is gained, and this should be brought out on the face of our minutes: that we sought for information, conveying as civil a protest as we could thereby against the proposed injury to St. Mark's; that we sought it in the proper manner, through our Foreign Minister, but that, as he declines to give us any help, we cannot with advantage or self-respect go further. We have discharged our duty, and the responsibility, whatever it is, rests on him. It is quite plain that the Italians and the Italian Government are not in a mood to receive well any representations from us, and therefore I see no use in forcing them on them. In laying the letter before the Council it may, perhaps, be desirable to read them what I have now written.—Believe my yours sincerely,

"Carnarvon."

The following resolution of Council (December 16, 1879) was then laid before the meeting:—

"The Council concur with Lord Carnarvon in thinking that no useful purpose would be served by pursuing any further the question of St. Mark's. The Council feel that they have done their duty in the matter as temperately and courteously as the circumstances demanded, and if their efforts have proved abortive they feel the responsibility, as Lord Carnarvon observes, does not rest with them."

The Secretary further stated that he had been instructed by the Council to lay before the meeting the following letter from the Lords Commissioners of her Majesty's Treasury, dated December 13th, 1879, together with the reply thereto from the Council, dated December 17th, 1879:—

"Treasury Chambers, Dec. 13, 1879.

"Sir,—I am directed by the Lords Commissioners of her Majesty's Treasury to acknowledge the receipt of your letter of the 28th ult., forwarding, by the desire of the Earl of Carnarvon, a memorial from the President and Council of the Society of Antiquaries of London, in which the attention of my lords is called to the serious inconvenience and difficulties experienced by historical inquirers in consequence of the virtual inaccessibility of a large series of national and other records, and in which it is prayed that an annual grant of £2,000 may be made, at a convenient opportunity, from the public expenditure, to be expended, under the responsibility of the Society of Antiquaries, on the publication of national records not provided for by existing grants. I am in the first place to acquaint you that my lords have carefully considered the various statements made in the memorial, and that they are sensible of the value of the documents, &c., referred to as affording materials for the filling up the deficiencies of contemporary chronicles, and for tracing the growth of our national institutions. But I am to request that you will inform the President and Council of the Society that, whatever decisions may be arrived at at a future date upon the question of editing such a collection of historical papers as that contemplated by the society, no vote for such a service can be included in the estimates of the coming financial year.—I am, sir, your obedient servant,

(Signed) "Robert Lingen."

"Society of Antiquaries of London,
"December 17th, 1879."

"Sir,—I am directed by the President and Council of the Society of Antiquaries of London to acknowledge the receipt of your letter of the 13th inst., in which the Lords Commissioners of H.M. Treasury express their sense of the value of the national and other records referred to in the memorial which I had the honour of forwarding to you on behalf of the President and Council on the 28th inst., but add that no vote for such a service can be included in the estimates of the coming financial year. The President and Council instruct me to say that under these circumstances they, of course, forbear for the present to urge further their request, but they hope at some future and more convenient period they may again invite the attention of the Lords Commissioners to a matter which so nearly concerns not merely the historical student, but also the general interests of the public at large.—I am, sir, your obedient servant,

"C. Knight Watson."

This being an evening appointed for the ballot, no papers were read. The following were elected as ordinary Fellows:—Rev. J. A. Bennett, Rev. Canon Stubbs, Messrs. C. J. Ferguson, S. Leighton, G. Payne, jun., C. T. Gatty, J. Parker, jun., W. E. Howlett, S. R. Bird, and E. A. Bond; and as honorary Fellows, Mr. F. A. G. Campbell and Carlos Ribiero. Mr. Bond and Prof. Stubbs were proposed by the Council, *propter merita*.

Jan. 15th.—E. Freshfield, Esq., V.P., in the chair.—The Hon. C. L. Wood was elected a Fellow. Mr. F. Ouvry exhibited a fragment of pottery of the thirteenth century dug out of the cliff at Lowestoft. Mr. W. de Gray Birch communicated notes on a charter of Eadgar, King of the Mercians, dated A.D. 958, belonging to the dean and chapter of Wells, by whose permission a photograph of the charter was also exhibited. This document was a grant by Eadgar to his faithful "minister"—the Latin equivalent for *thayne* or "thane''—Ealhstan, for forty *mancunæ* of pure gold, of the land of six *manentes*, in a place called Stanton, in the territory of the Magesætæ, for ever, subject only to the "triple burden" of Saxon taxation of land, *i.e.*, the *trinoda necessitas*, or repairing of bridges, fortifications, and military service. This charter makes a slight contribution towards the solution of the vexed question as to the position of the "pagus Magesætna." It must evidently be in Herefordshire, and must be contiguous to a Stantun. Mr. Birch concluded his notes with an appeal to the society to take steps to organise some machinery for producing a proper Codex or Corpus of Saxon charters, with the text of every known charter collated, the dates worked out, the localities and personages as far as possible identified, the peculiarities of the language and of the terms pointed out and illustrated. A discussion followed, in which Messrs. H. C. Coote, H. S. Milman, T. Morgan, and the Chairman took part, and warm approval was expressed of Mr. Birch's proposal to set about a new edition of Kemble's "Codex Diplomaticus." The Rev. Baron communicated a paper on certain "Greek and other Early Features of Stockton Church, Wilts." The feature which had more especially impressed Dr. Baron with the notion of a reminiscence of Greek arrangement and ritual was the east wall of the nave, which had an opening in the centre, fitted with doors, and on each side one of those apertures variously called squints or hagioscopes. These seemed to him to recall the Iconostatis of a Greek church. In the discussion which followed, the Rev. B. Webb, Messrs. W. White, H. T. Micklethwaite, E. R. Robson, and the Chairman confessed themselves unable to see any trace of Greek influence in the arrangements of Stockton Church. Dr. Baron's paper, however, contained a number of valuable incidental illustrations of early architecture and ritual.

Jan. 22nd.—E. Freshfield, Esq., V.P., in the chair. The following gentlemen were elected Fellows:—The Rev. Canon Stubbs, Messrs. E. A. Bond, S. R. Bird, C. W. Dymond, G. Payne, jun., and the Rev. T. F. Falkener. The council proposed for election, *honoris causâ*, Mr. E. M. Thompson. Mr. J. T. Micklethwaite exhibited four specimens of early glazed tiles from St. Alban's Abbey; Mr. C. H. Fowler a silver-gilt ring, which had been found, as he believed, in the grave of Lawrence Booth, Archbishop of York (*ob.* 1480), in Southwell Minster; and Mr. J. Brent two matrices of brasses, of unknown origin, which he had purchased at Canterbury. The Lords Commissioners of the Admiralty communicated a report which had been addressed to them by Capt. Sullivan, on the alleged discovery at San Domingo of the remains of the great navigator Christopher Columbus. Mr. H. S. Milman called the attention of the meeting to a report which had been issued by the Royal Academy of Madrid on the subject of this alleged discovery in 1877, and stated that the conclusions at which the commission had arrived, after careful sifting of evidence, were unfavourable to the authenticity of the remains in question. Mr. E. A. Bond said that the characters in which the inscriptions on the lid of the coffin were written, and of which a facsimile had been sent by the Lords of the Admiralty, were not such as to lend any support to the theory that these were the genuine remains of Columbus; neither did the language in which they were couched agree with the assigned date. Mr. Millman referred to an article which had been published on this subject by Sir Travers Twiss in the *Nautical Magazine.* The chairman observed that whatever might be the rights of the case, he was sure the society would feel how great were the obligations they owed to the Lords of the Admiralty and to Capt. Sullivan. He hoped that many more communications might be received from the same quarter, as officers of the Royal Navy must have frequent opportunities of observing archæological remains. Mr. W. M. Wylie communicated an account of some interesting Pfahlbau discoveries in the lakes of Bienne and Neufchatel, sketches of which he had received from Dr. F. Keller. One of the objects found was a huge implement of copper, in the shape of a *bipennis* or double axe, over 16 inches in length, and about 6lb. 9oz. in weight. Mr. Wylie believed that this object was in an unfinished condition. He quoted various allusions in classical authors to the existence of a *bipennis* as a weapon of war. Mr. E. Peacock laid before the society some remarks on the use and history of the word "Osmund" as the designation (it would seem from the authorities quoted) of a kind of iron ore. Mr. Peacock was anxious to find some clue to the origin of the word. Dictionaries seemed only to copy each other, and to throw no new light. Mr. J. E. Lee communicated an account of some remarkable cave explorations, which had been conducted with singular zeal and energy by the manual labour of one man, Mr. J. L. Widger, at Tarboyan, Devon. These caves are five in number, of which probably one or two may be regular caves; one may be called a rock shelter, the others are little more than fissures. They had yielded a large collection of flint implements, teeth of bear and rhinoceros, bones of the reindeer, horse, and wolf, or dog. To have achieved such results single-handed redounded highly, in the opinion of Mr. J. E. Lee—than whom no one could be a more competent judge—to the credit of Mr. Widger, whose perseverance and determination were beyond all praise.

Jan. 29th.—E. Freshfield, Esq., V.P., in the chair. The following gentlemen were appointed auditors for the past year:—E. Freshfield, Dr. Ogle, H. C. Coote, and H. S. Milman. The following were appointed local secretaries:—Rev. J. Beck (Suffolk), Rev. T. Armfield (Essex), Mr. T. F. Kirby (Hampshire), and Mr. E. Purser (Asia Minor). Lord Dillon exhibited a gold bracelet, composed of hollow gold cylinders strung together, found at Pompeii, and given by Ferdinand I., King of the Two Sicilies, to Mr. W. R. Hamilton, formerly Fellow and Vice-president of the Society, who between 1822-1824 was ambassador at the Court of Naples, and who was connected by marriage with the Dillon family. Mr. R. W. Binns exhibited an achievement of arms of the time of Elizabeth, comprising the arms of all the peers of the realm at that time for the year to which it belonged, painted on a square panel, which was the property of a so-called Hadley Club, near Worcester, which had existed for upwards of a century. On this object Mr. A. W. Franks made some remarks in identification of certain coats of arms which were rather obscure. Mr. J. H. Middleton communicated an account of two marble pillars in the Ashmolean Museum at Oxford, which had belonged—as was shown from Sandford's engraving, and from undoubted marks of Torrigiano's handiwork—to the high altar of Henry VII.'s Chapel at Westminster Abbey. The secretary stated he had received a communication from Mr. W. Burges, pointing out that he had already incidentally indicated the *provenance* of these pillars in a report he had made (1874) on the altar screen at King's College, Cambridge. The Rev. W. D. Macray communicated an account of a curious volume, a small quarto of fifty-three pages, which seems to have entirely escaped the notice of those who have studied and written the history of Henry VIII. It was published, *circa* 1541, under the title "L'Oraison et Remonstrance de haulte et puissante Dame Madame Marie de Cleves, Sœur de treshault et puissant Seigneur le Duc de Juilliers, de Cleves, et de Gueldres: Faicte au Roy d'Angleterre et à ceulx de son Conseil. Joannes a Luxemburgo III. faciebat." It was printed, as the colophon states, at "La Riuou par Maistre Nicole Paris, Maistre ès Arts, treshumble Serviteur et Imprimeur de hault et puissant Seigneur Messire Jean de Luxembourg." By "Riuou" is meant L'Arrivour (Lat. Ripatorium), a Cistercian monastery in the diocese of Troyes (founded A.D. 1140), where John of Luxembourg (third son of Charles of Luxembourg, Count of Brienne), Abbot of Ivry and Arrivour, third Bishop of Pamiers, had set up a printing press, under the direction of Nicole Paris, a printer whom he had brought from Troyes. (See the "Dictionnaire de Géographie à l'Usage du Libraire," par un Bibliophile, *s. v.* "Ripatorium.") Mr. Macray believed that the chief reason why this book had thus escaped the notice of historians was the blunder in the title, by which Anne is made to bear the name of her mother, Mary of Cleves. The book appears to have been written at the moment when the separation of Anne from Henry VIII. was under discussion, and is under the form of an appeal from Anne herself to the king, and amid the flattery with which it abounds are some sharp insinuations and reproaches, which must have irritated the monarch not a little. The covert object of the book—which the French king promised the English ambassador Paget should be suppressed (see State Papers, Hen. VIII., part v. p. 660)—was no doubt to damage Henry VIII. in the eyes of Europe. A second edition, however, followed the first, in spite of the promise of Francis I., and from France the book passed into Italy, where a translation appeared at Bologna in 1558; but, strange to say, no mention has ever been made by any English writer of this attempt to enlist sympathy abroad in favour of Anne of Cleves.

ROYAL SOCIETY OF LITERATURE.

Jan. 28th.—J. Haynes, Esq., in the chair. Dr. Ingleby read a paper "On the English Spelling Reform Deadlock," in which he stated that he had joined the English Spelling Reform Association, because in the interest of education it appeared to him to be expedient to amend the existing spelling of English, the time having now arrived, he thought, when combined action should be adopted with the view of thoroughly improving the present system. He agreed that a normal orthography should be accepted for the spelling of our language; but he was not prepared to accept a purely phonetic plan, the basis of which ignores our usual pronunciation. Dr. Ingleby added a careful notice of the schemes proposed by Dr. M. Bell and Mr. A. J. Ellis.

ENTOMOLOGICAL SOCIETY.

Jan. 21st.—Anniversary Meeting.—Mr. J. W. Dunning, V.P., in the chair. The following gentlemen were elected as officers and council for the ensuing year:—President, Sir J. Lubbock, Bart.; treasurer, E. Saunders; librarian, F. Grut; secretaries, R. Meldola and W. L. Distant; other members of council, H. W. Bates, W. Cole, J. W. Dunning, F. du Cane Godman, O. Salvin, H. T. Stainton, S. Stevens, and J. J. Weir. In the absence of the president, an address was read by Mr. J. W. Dunning.

BRITISH ARCHÆOLOGICAL ASSOCIATION.

Jan. 7th.—Mr. T. Morgan in the chair.—Mr. T. Watling reported the discovery of some elaborately ornamented bronze vases of Roman date at Ixworth. A large collection of antiquities from various places was exhibited by many members, among which was a portion of an iron shot, 4 in. in diameter, found at Allington Castle, a relic of the siege of that building. Mr. Compton produced a deed of admittance to the Manor of Woking, granted to John Macknell, 1654, which was found in Ewhurst Church, Sussex, during repairs. Mr. Loftus Brock described the works, now far advanced, at the Tower of London, which have so far resulted in the clearing of the space between the inner and the outer walls. The towers and walls now thrown open to view present an aspect of great strength, and are well worthy of inspection. A portion of the original Norman work of the White Tower is also visible through the removal of the Armoury. Mr. R. Allen read a paper descriptive of a remarkable prehistoric cist at Kilmartin Church, Argyleshire. It was found about ten years ago during some trenching works for plantation. It is 6 ft. 10 in. long by about 3 ft. broad. Its construction of rough stone resembles many others, but in this instance it is remarkable for having two of the end stones sculptured with singular devices. On one there are seven axeheads, and on the other a singular comb-like grouping, which Mr. de Gray Birch considered to resemble a true Ogam. Mr. Allen pointed that these carvings are unique in Great Britain, although a few of somewhat similar form have been met with in Brittany, rubbings of which were shown. The second paper was by Mr. S. H. Jeayes, "On Ancient English Guilds," with reference to some unpublished documents which were exhibited or described. One of these was a form of admission to the Guild at Boston, a printed sheet by Pynson, with the names left blank for filling up. These documents mostly related to the days or periods from which the members were to be absolved from the pains of purgatory, and were in other respects very curious.

Jan. 21st.—Mr. S. Cuming in the chair. Mr. R. Blair exhibited the impression of an engraved carnelian found at South Shields, where so many similar objects have been found, It represents a winged equestrian figure, engraved—as Mr. King, of Cambridge, supposed—to record some particular cavalry charge. During the recent works at Bangor Cathedral an engraved sepulchral slab of much beauty was found. A photograph of this object was exhibited by Mr. Irvine. It represents a lady clad in the costume of the middle of the fourteenth century, with the peculiar head-dress of the period, and a curious side purse hanging from the waist. The Rev. S. M. Mayhew again contributed a series of remarkable objects. Some Rhodian glass attracted much attention, but the principal interest centred in a singular branched candlestick of metal, having five lights arranged like the seven-branched candlestick of the Temple of Jerusalem. It was of Indian workmanship of ancient date, and it caused an animated discussion upon the existence of Jewish elements in Hindustan. Mr. W. Smith produced several prehistoric flint implements picked up by him from the metalling recently laid on the roads in the north of London. The gravel thus used had been obtained from pits in the same locality. Mr. L. Brock, in calling attention to the differences between the Gris de Flandre ware of the Low Countries and that made at Fulham at the end of the seventeenth century, exhibited a curious jug of undoubted foreign manufacture. Miss Halliwell-Phillipps forwarded a drawing of an early doorway at Patcham Church, near Brighton. The first paper was by Mr. H. W. Cope, and was descriptive of ancient jade implements. After referring to the recent discovery in the Rhone, he spoke of this material being known in the oldest city of Ilium, and traced its use to modern times, illustrating his remarks by the exhibition of objects of great value and beauty. The second paper was by Mr. W. de Gray Birch, "On Inedited Documents." These were from Norwich, Ely, Wells, &c. One of the last referred to a fair formerly held in the nave of the cathedral.

MATHEMATICAL SOCIETY.

JAN. 8TH.—C. W. Merrifield, Esq., President, in the chair.—Prof. W. S. Burnside was elected a member.—Prof. Cayley communicated a theorem in spherical trigonometry and a note upon a posthumous paper of Prof. Clifford's, "On the Theory of Distances." The Chairman supplemented his paper read at the December meeting with a few further remarks. Mr. Hammond gave an expression for the complementary function in fractional differentiation. A discussion arose upon the subject, in which Prof. Cayley, the Chairman, Messrs. Roberts, Glaisher, and Freeman took part.

INSTITUTION OF CIVIL ENGINEERS.

JAN. 13TH.—The new President, Mr. W. H. Barlow, delivered an address. Twenty-three candidates were elected, viz., Messrs. H. R. P. Carter, T. C. Fidler, C. O'Neill, T. Seyrig, H. Wallis, and T. P. Watson as members; Messrs. W. Crickmay, G. Darbishire, A. Downie, J. Francis, L. P. P. Galwey, G. A. Goodwin, J. Horan, H. G. McKinney, A. Primrose, H. de Q. Sewell, J. Standfield, R. F. Ward, H. Woodcock, and W. B. Worthington as associate members; and Messrs. W. M. Cunningham, J. M. Lives, and W. H. Topham as associates.

JAN. 20TH.—Mr. W. H. Barlow, President, in the chair.—The following papers were read: "On Fixed and Movable Weirs," by Mr. L. F. Vernon-Harcourt; and "On Movable Dams in Indian Weirs," by Mr. R. B. Buckley.

FEB. 3RD.—Mr. W. H. Barlow, president, in the chair. It was announced that the council had recently transferred Mr. John Penn to the class of members. The monthly ballot resulted in the election of Mr. J. Tyndall as an honorary member; of Messrs. G. Anderson, J. C. Bothams, C. A. Brereton, T. W. Miles, and S. A. Stewart as members; of Messrs. A. W. H. Bellingham, R. C. Brebner, J. G. Chandler, C. W. F. Farewell, J. R. George, C. H. Holme, H. B. Hutchings, G. Jameson, R. H. Julian, J. W. Logan, E. R. Morris, W. W. Shanks, C. L. Sim, G. H. Sykes, J. C. Vaudrey, and F. Walsh as associate members; and of Capt. S. Buckle, Messrs. R. Capper, C. Higgins, and J. O. Phillips as associates.

ASIATIC SOCIETY.

JAN. 19TH.—Sir H. C. Rawlinson, President, in the chair.—Prof. Dowson read a paper "On a Curious Litigation between the Smartava Brahmans and the Lingayats when two Copper Plates were produced," in which he stated that the Smartava Brahmans, in the south of India, have twelve Maths, or monastic establishments of high antiquity. The chiefs of these Maths are held in great honour, and among the marks of their dignity is the privilege of being carried in a *palki* crosswise, so as to sweep the road. These Brahmans are much troubled by the Lingayats, a dissentient sect some six or seven centuries old, who are very numerous in their neighbourhood. The chief of these Lingayats, to assert his own dignity, caused his *palki* to be thus carried, the result being riots and disturbances. At length the head of a Brahman Math brought an action against the Lingayat for damages in compensation for the loss of the honour he deemed due to him, at the same time producing two copper plates, dated in the twelfth century, A.D., and purporting to be grants of this privilege from a monarch of the time. The Brahman, having lost his suit, appealed to her Majesty in Council, translations of the two copper plates being sent home with the appeal. As these, however, were unintelligible, the case was referred back to India, but though many years have passed, no more has been heard of it. The impressions of the copper plates then sent having been very indistinct, Prof. Dawson suggested that endeavours should be made to obtain more accurate copies, as the originals are certainly of some antiquity, and contain many curious references. He added that there was reason for suspecting them to be forgeries, as there occurs on them the name of Madhava, a teacher who lived two centuries later than the date ascribed to them. Moreover, the words rendered *cross-palki* do not bear this meaning.

NUMISMATIC SOCIETY.

JAN. 15TH.—J. Evans, Esq., President, in the chair.—Mr. C. Stephen was elected a member. Mr. Hoblyn exhibited a shilling of Charles II., 1663, with the arms on the reverse blundered: a crown of William III., 1696, reading GEI GRATIA (*sic*); a shilling of the same year, with a capital Y (for York); a shilling of Anne, 1711, with the younger bust, although the old or fourth bust had appeared on a shilling of the previous year. Mr. Henfrey exhibited an unpublished annulet groat of Henry V. or VI., struck at London, but having the annulets on either side of the king's bust instead of, as is usual with the London groats, on the reverse. Mr. Evans exhibited a sovereign of Henry VII.'s first coinage, much bolder in style than those of the later issues and of extreme rarity. Major A. B. Creeke communicated a paper on silver coins of Eanred and Ethelred II. of Northumbria, similar in all respects to the copper stycas. Mr. P. Gardner read a paper on the indications afforded by the coinage of Macedonia and Thrace of the worship of the sun in those districts, in which he drew attention to the various solar symbols occurring on the coins of the towns of Uranopolis, Mesembria, &c.; on those of the kings Antigonus Gonatas, Philip V., and Perseus; and on the money of Macedonia under Roman dominion. He identified the Thracian Ares as a solar divinity, and expressed it as his opinion that the laureate head on the gold money of Philip II. of Macedon, usually called Apollo or Heracles, was in reality intended to represent Ares. The aspect of this head bore, Mr. Gardner said, a striking resemblance, which could hardly be fortuitous, to that of the head on the bronze coinage of the Mamertini in Sicily, which is expressly designated on the coins themselves as that of Ares. A discussion followed, in which the President concurred with Mr. Gardner, while Mr. B. V. Head was inclined to doubt whether Philip, who prided himself especially on being a Hellene and the bulwark of Hellas against the barbarians, would have chosen the god of the barbarous Thracian tribes whom he had just subdued as the principal device of his new gold coinage, in preference to the Hellenic Apollo or Heracles.

STATISTICAL SOCIETY.

JAN. 20TH.—Sir R. W. Rawson in the chair.—Mr. G. P. Bevan read a paper "On the Strikes of the Past Ten Years."

CHEMICAL SOCIETY.

JAN. 15TH.—Mr. Warren De la Rue, President, in the chair.—The following papers were read: "On the Effects of the Growth of Plants on the Amount of Matter Removed from Soil by Rain," by Dr. J. H. Prevost. Soil three inches deep was placed in two glazed earthenware pans, seventeen inches in diameter; on July 21st four grm. of white clover seed were sown in one, the other being blank. The pans were exposed till October 4th; the drainage water was collected and analysed; that from the clover soil contained 48·1 grains of solid matter per gallon, the other 220. The author concludes that rain removes much more matter from an uncropped than from a cropped soil. Mr. W. Blyth described a simple apparatus for the treatment of substances in open dishes by volatile solvents. "On Dibromanthraquinones," by Mr. W. H. Perkin.

ANTHROPOLOGICAL INSTITUTE.

JAN. 13TH.—J. Evans, Esq., V.P., in the chair.—Dr. H. Tuke read a paper "On the Cagots." The author, rejecting the popular derivation of the word from "Canis Gothi," accepted the suggestion of M. de Rochas that Cagot is derived from the Celto-Breton word *Cacod* (Leprous). It is easy to see how readily this would assume the form of Cacou (as it is in Brittany actually applied to these people), and so the French Cagou or Cagot. The conclusions at which the author arrived as to the origin of the Cagots were as follows:—1. The Cagots are not the descendants of the Goths, they are not a distinct race, but a despised class among the people of the country in which they live. 2. They are not more subject to goître or to cretinism than the inhabitants of the adjacent district—in short, Cagotism and cretinism are in no way allied. 3. The present representatives of the Cagots are now recognised by tradition, and not by their features, and are not distinguished by any peculiar mental or physical disorder. 4. Although nothing like leprosy or leucoderma has for a long time affected the Cagots, and no one on the spot regards them in this light, there is evidence to show that they were originally either lepers labouring under a particular variety of leprosy, or were affected with leucoderma—the form of the affection accounting for their being regarded as in some respects different from ordinary lepers, though shunned in the same way. 5. Many were no doubt falsely suspected of leprosy in consequence of some slight skin affection; others again, in later centuries, were members of families in which the disease had died out. The Director read two papers by Mr. A. Simson, "On the Jivaros" and "The Canelos Indians." The tribe of the Jivaros is a large one, and one of the most distinguished, independent, and warlike in South America. They speak a language of their own, Jivaro, and occupy the country generally from the Upper Pastassa to the Santiago, both rivers included, down to the Pongode Manseriche, on the Maranon. They are hospitable, and their houses are large and built of palms. They have a most perfect method of scalping, by which the victim's head is reduced to the size of a moderately large orange, maintaining tolerably well all the features. The skin is cut round the base of the neck, and the entire covering of the skull removed in one piece. This is then dried gradually by means of hot stones put inside it, until the boneless head shrinks to the required size. They also wear their slain enemies's hair in long plaits round the waist. Great festivities take place when a child, at three or four years years of age, is initiated into the art and mysteries of smoking. The Jivaros of the Pintue have the habit of vomiting nearly every morning by the aid of a feather, arguing that all food remaining in the stomach overnight is unwholesome and undigested, and should therefore be ejected. Canelos, the once attractive Spanish settlement, but now forlorn Indian village, is situated on the left bank of the Bobouaza, one of the most important, if not the largest, of the tributaries of the Upper Pastassa, and is inhabited by a mixed tribe of Indians, in whom the chief element is Jivaro, though some of the better traits of these seem to be wanting in them. Their languages is Quichua. Their fighting is done entirely by the lance, which is their inseparable companion, and all the author's attempts to induce any of them to part with his weapon were fruitless.

LINNEAN SOCIETY.

JAN. 15TH. — Prof. Allman in the chair. Messrs. J. Poland, J. D. Stephens, and Prof. A. Thomson were elected Fellows, and T. J. Parker an associate. Mr. A. J. Hewett exhibited and made remarks on a common web or community of cocoons and the moths (genus Anaphe ?) escaped therefrom, said to have been got at Old Calabar. Mr. Baker brought under notice a monstrous form of thistle (*Carduus crispus*), obtained by the Rev. J. A. Preston in Wiltshire. In this specimen the capitula were abnormally numerous, and aggregated in secondary heads, as in Echinops. A Moa's tibia and tarsus (*Dinornis maximus*), dug up four feet from the surface at Omane, New Zealand, were shown on behalf of Mr. J. Forsyth. A paper was read " On the Birds and Mammals introduced into New Zealand," by Mr. H. M. Brewer. The author refers to Dr. Buller's "Avifauna" of New Zealand as not written too soon, for the rapid disappearance of many highly interesting forms is to be deplored. Finches and other small birds introduced are preyed on by the New Zealand owl : but nevertheless quite a long list of British songsters, game birds, and others has been established. In some districts pheasants abound ; and it is noteworthy that when the tremor of an earthquake occurs the cock pheasants set up a continuous crow, either of fear or defiance. Partridges thrive best on the south island. Red deer are seen in herds on the hills near Nelson. Hares have increased too rapidly, and the female in New Zealand has become more prolific, giving birth to six or seven at once. Kangaroos and various mammals have likewise been imported ; but unfortunately facts mentioned point out that the acclimatisation of some of them is not altogether an unmitigated blessing to the farmer colonist. There followed a memoir by Mr. J. G. Baker, "Synopsis of the Aloineæ and Yuccoidæ." To these two tribes belong all the shrubby arborescent tribes of the capsular Liliaceæ. Aloes being entirely to the Old World, out of a total of 200 species, 170 are concentrated at the Cape of Good Hope, the remainder in the highlands of tropical Africa. Of the Yuccoideæ there are about fifty species altogether, and nearly all are natives of Mexico and the southern United States. The Yuccas fruit rarely under cultivation, the large white pendulous flowers being in the wild plant fertilised by a moth of the genus Pronuba. Herreria, belonging to temperate South America, is a shrubby climber.

ZOOLOGICAL SOCIETY.

JAN. 20TH.—Prof. Flower, president, in the chair. The secretary read a report on the additions made to the menagerie during December. Mr. H. N. Mosely exhibited and made remarks on some microscopic preparations of corals, made by a new method invented by Dr. G V. Koch. Prof. Flower read a letter addressed to him by Colonel Heysham, of the Madras Commissariat Staff, on two cases of female elephants, in India, having produced young in captivity. Dr. A. Gunther exhibited and made remarks on a drawing of a West Indian fish (*Holacanthus tricolor*), obtained on the coast of the Island of Lewis, and believed to have been found for the first time in the British seas. Mr. P. L. Sclater read some remarks on the species of the genus Tyrannus, in relation to a paper on this subject recently published by Mr. Ridgway in America. Papers and communications were read from Mr. R. Trimen on a new species of Roller (Coracias) from the Zambesi, which he proposed to name *C. spatulata*, from its long spatulated tail ; from Mr. A. Agassiz, of Cambridge, Mass., on some points in the history of the synonymy of Echini, in reference to some papers recently published by Mr. Bell in the Society's *Proceedings* ; and by Mr. F. Moore on the genera and species of the Lepidopterous sub-family Ophiderinæ inhabiting the Indian region.

METEOROLOGICAL SOCIETY.

JAN. 21ST.—Annual General Meeting.—Mr. C. Greaves, president, in the chair. Dr. Tripe read the Report of the Council for the year 1879, which showed that the society was in a satisfactory condition ; eighty-four new Fellows have been elected, and the total number at the end of the year was 473. The great local differences in temperature and humidity require to be more accurately ascertained than they are at present, and this remark applies not only to sea-side places, but also to inland districts in their relation to hills and valleys. It is with a view of obtaining better knowledge on this subject that the council have instituted a new class of stations of a third order, to be termed "Climatological," at which observations of temperature, humidity, cloud, and rainfall are taken daily at 9 a.m. only, with certified instruments, the thermometers being in Stevenson's screens, so that the observations of temperature at the different stations may be strictly comparable. The total receipts for the year were £799 6s. 9d., and the expenditure £621 19s. 5d., leaving a balance in favour of the society of £177 7s. 4d. The president delivered his address, in which he advocated a more attentive inquiry by the students of meteorology into the subject of hygrometry. The following gentlemen were elected the officers and council for the ensuing year:—President, G. J. Symons ; vice-presidents, E. E. Dymond, C. Greaves, Rev. W. C. Ley, and Captain H. Toynbee ; treasurer, H. Perigal ; trustees, Sir A. Brady and S. W. Silver ; secretaries, R. H. Scott and Dr J. W. Tripe ; foreign secretary, J. K Laughton ; council, A. Brewin, W. Ellis, R. Field, F. Gaster, Dr. J. H. Gilbert, W. J. Harris, B. Latham, R. J. Lecky, Hon. F. A. R. Russell, R. Strachan, H. S. Tabor, and G. M. Whipple.

GEOGRAPHICAL SOCIETY.

JAN. 26TH.—Lord Houghton in the chair. The following gentlemen were elected fellows :—Major S. T. Bridgford, Lieut. L. A. Wainwright, Messrs. S. N. Braithwaite, T. Christy, H. H. Crewe, J. Dixon, J. [illegible]. Head, W. L. Hunter, S. Lowe, C. J. [illegible], M. Stratford, E. Stock, S. Stubbs, [illegible] W. Watson. The paper read was a "Journey hrough South Central Africa, from the Diamond Fields to the Upper Zambesi," by Dr. Emil Holub.

QUEKETT MICROSCOPICAL.

JAN. 23RD.—Dr. T. S. Cobbold, president, in the chair. Eleven new members were elected. Portions of Ostend rabbit containing large quantities of Cysticercus were placed upon the table for distribution, and the nature of this Entozoon was briefly described by the president. The president also exhibited a large section of bone newly formed round the shaft of a human femur destroyed by necrosis. Mr. Ingpen exhibited and described Mr. Wenham's new immersion illuminator, the merits of which were afterwards discussed. Dr. H. Whittel read a paper " On the Association of Bodies resembling Hydrosperma with the Degeneration of Hydatid Cysts," in the course of which he detailed a number of facts tending to show that the existence of these bodies in the fluid drawn from hydatid cysts indicated the death of the Echinococci and the degeneration of the cyst, of which changes he regarded them rather as a result than a cause. Some observations on the same subject were made by the president. Mr. A. D. Michael exhibited and described some specimens of *Ornithobia æviculata* and other insects found parasitic upon a jay.

PHOTOGRAPHIC SOCIETY.

JAN. 13TH.—J. Glaisher, Esq., president, in the chair. Mr. L. Warnerke, who at the previous meeting had described all existing actinometers, on this occasion read a paper " On a New Actinometer " of his own invention, based upon the use of phosphorescence as a retainer of light. He has devised an ingenious apparatus, which permits the sensitive substance to be seen under gradually darkening figures. The number last seen before the light becomes invisible determines the value of the actinic power at the moment.

PHYSICAL SOCIETY.

JAN. 24TH.—Prof. W. G. Adams in the chair. Mr. W. Ellis was elected a member. Mr. Grant read a paper " On Induction in Telephone Circuits," and Dr. O. J. Lodge detailed the mathematical theory of the action of Prof. Hughes's induction balance. Afterwards Herr Faber exhibited his new speaking machine to the audience. This consists in a mechanical imitation of the human organs of articulation, including a bellows for the lungs, a windmill for trilling sounds, a larynx, lips, tongue, and nose. By means of certain levers to work these organs fourteen distinct oral sounds can be produced, and by combining these again any word of any language can be uttered by the machine.

ROYAL INSTITUTION.

FEB. 2ND.—Duke of Northumberland, president, in the chair. His Royal Highness Prince Leopold, K.G., was elected an honorary member. Messrs. J. Carteighe and F. C. Mathieson were elected members.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

FEB. 3RD.—Dr. S. Birch, president, in the chair. Six new members were elected. The following paper was read :—"Some Remarks on Excavations made in Tel-el-Yahoudee (the Mound of the Jew), near Cairo, and on some antiquities brought therefrom and now in the British Museum," by Prof. T. H. Lewis. Mr. Pinches announced that he hoped to be able to lay before the next meeting of the society some account of a table of peculiar interest. So far as he had been able to examine it, it appeared to contain the annals of the sixth, seventh, eighth, ninth, tenth, and eleventh years of the reign of Nabonidus (about B.C. 550-539), giving some new information. The reverse of the tablet contained facts of great historical importance—evidently the history of the last year of the reign of Nabonidus (B.C. 538), giving an account of the overthrow of this king and capture of his city of Babylon, on the 16th of the month Tammuz, by the celebrated general Gobryas, under Cyrus the Great, King of Persia.

SOCIETY OF ARTS.

JAN. 30TH.—Admiral Selwyn in the chair. A paper "On Herat" was read before the Indian Section of the Society by Colonel G. B. Malleson.

FEB. 2ND.—The opening lecture of the second course of Cantor Lectures, "On the Manufacture of India-Rubber and Gutta-Percha," was delivered by Mr. T. Bolas.

FEB. 3RD.—W. C. Sargeant, Esq., in the chair. A paper "On Social and Commercial Prospects in the Transvaal" was read before the Foreign and Colonial Section of the Society by the Rev. G. Blencowe.

FEB. 4TH.—C. R. Markham, Esq., in the chair. The paper read was "On Trade and Commerce with Siberia *via* the Kara Sea," by Mr. H. Seebohm.

SOCIETY OF ENGINEERS.

JAN. 28TH.—Mr. R. Paulson Spice, the past president, presented the premiums of books which had been awarded to the following gentlemen for papers read during the past year, viz.:—To Mr. C. J. Alford, for his paper "On the Mineralogy of Sardinia," and to Mr. T. Andrews for his paper "On Wrought Iron Axles." Mr. J. Bernays, who had been elected president for 1880, delivered his inaugural address. Mr. Bernays regretted the loss of the valuable services of Mr. P. F. Nursey, their late secretary, who was now, however, still useful to the society as a member of council.

ON LIGHTING MINES.

BY MR. PURDY.

AFTER some eloquent statements as to the fearful character of mine explosions and scientific explanations in regard to them, Mr. Purdy, in his paper which was read by Mr. T. Morgan before the Inventors' Institute last month, proceeded as follows:—

The question of lighting our mines has been for many years one of great interest, and since men have to leave the light of the sun to delve in the earth, some artificial light has to be provided. Perhaps one more suitable for the miner to carry out his work has not been introduced than the old primitive candle and a lump of clay, as he can move it anywhere at his will, and so place it to throw its light on the spot where he requires it. But since naked lights are not safe other means have had to be provided. It is an old saying that necessity is the mother of invention. Perhaps no question has, or ought to have, aroused the inventive powers of engineers and mechanics than a safety lamp for the miner. It is said, since the year 1710, when explosions first appeared in Belgium resulting from working coal seams, that not less than 400 patents and improvements in safety lamps and locks for the same have been entered, and perhaps one that will meet every requirement of the miners has not yet appeared. At the same time I fully believe that had the men who have distinguished themselves in this cause been more practical, a thorough safety-lamp would have been arrived at many years ago. History holds out some facts that safety lamps were tried for by various persons many years previous to the gauze lamps. Dr. Clanny in 1814 was moved to do something in the protection of the flame from fire-damp when he proved to the Royal Committee that more than 200 men's lives had been sacrificed in that year by explosion of fire-damp, leaving over 300 women and children unprovided for. The fact was generally known throughout our own and other countries that some protection was needful, and as explosions increased rapidly, resulting in loss of life and property, Dr. Clanny at this time invented a lamp, and thought he had overcome this great evil in mining. But his lamp was cumbersome, as he forced air in through a thin layer of water by means of a bellows. In 1815, Sir Humphry Davy made the wonderful discovery of the gauze as a protector of the flame from fire-damp, and found by his experiments that flame would not pass through a fine gauze mash, having 784 apertures to the square inch, without being drawn or propelled. George Stephenson, in this same year, had arrived at his third safety lamp. Previous to the year 1814 many inventions had been tried, for explosions rapidly increased. It is the opinion of some that had Stephenson's third lamp been introduced to Government he would have been honoured. But Davy being a more learned man introduced his lamp to Government, and not only got honoured, but his lamp was extensively used for a long time. The Stephenson lamp was to some extent lying dormant. The Royal Committee of 1835, after collecting a large amount of evidence, proved that more persons had lost their lives from colliery explosions for the eighteen years succeeding the introduction of the Davy safety lamp in 1816 than the eighteen years preceding the invention. When the lamp was experimented on in the presence of Sir Humphrey, and the gas exploded outside, then Sir Humphry, addressing Lord Durham and many other gentlemen present, said, "Now, gentlemen, you see the nature of the danger which you are exposed to in using the lamp, and I caution and warn you not to use it in any such places if it can be avoided without the shield." Unfortunately these explosions did not cease then, but have been rapidly increasing since 1710. Notwithstanding the inventions and improvements of safety lamps, and the scientific achievements that have been made in ventilation of our mines, loss of life from this cause has increased year by year. During a period of the last 23 years, from 1856 to 1878 inclusive, not less than 5,556 lives of our honest-hearted British workmen have been sacrificed through colliery explosions, and in this period of time 2,404,917,538 tons of coal have been raised in Great Britain and Ireland; and in the present year a fearful number is already scored on, notwithstanding the use of safety lamps and powerful apparatus for ventilation. It is supposed that three-fourths of these explosions have occurred under atmospheric changes. It will be clear to all practical men from experiments made of late, and explosions on the very surface of safety lamps, which have distressed our country that they cannot be trusted in the hands of inexperienced men, and this is sufficient argument to prove the gauze lamps to be nothing more than pictures of safety and not realities. For the very lamps that have been depended on for safety have proved a deadly weapon cherished in the bearer's hands. It is to be feared that colliery managers have, to a great extent, thought, because they had put lamps in the hands of workmen they were safe to work anywhere so long as their lamps would burn. The gauze lamps have been relied on until they have become nothing more than darkness in light. Recent experiments have proved that certain velocities will pass the flame through the gauze lamp, notwithstanding all the careful experiments that have been made with various lamps. It is really difficult to say of explosions how they occur, and by what means even if defective lamps be not found. Now, it is well known to practical men that breaks in the roof, floor, and sides are everything but in an upright or downright position, and more or less slant. When blowers make their way out of the floor, the breaks and upheavings which serve as channels or pipes to liberate the contents of fire-damp into the gate roads and working face, and pouring forth its discharge from many of these slant breaks at once. Then as a lamp is hanging, or carried across these slant feeders in an upright position, and in contact with these jets of gas which are pouring out at a furious rate, same propel the flame through these gauze lamps, and ignites the mixture outside, and no one can limit its destruction. Again, these lamps hanging up an accumulation of gas, same explodes inside the gauze lamps, and burns whilst there is oxygen to feed it. The gauze being of tender nature is speedily red hot, and thus ignites the gas outside. This evil may occur when a man or boy is carrying his lamp in his hand, as this may become red hot without being noticed till it is too late. Again, a workman or unskilled overman may be trying working places, cavities, or high breaks, the mixture may be at a violent point; he may slip or fall, or if it be a rare occurrence to see gas, may be frightened, bring down his lamp suddenly, and thus propel the flame through the gauze. Again, a blown-out shot, a door being left open, may cause a rapidity in the current, or stagnation in the current be caused by any derangement in the ventilation, which is followed by a mighty rush, blowing up the dust through the gauze, and igniting the mixture of gas and hot dust. Again, the gauze top may be covered with dust, and the lamp becoming shaken cause a stream of flame from the wick to the top of the gauze. Again, the lamp may be carried with or against the current across these jets of gas oozing from the floor or other breaks, and quickly become red hot. Practical men in fiery mines will have experienced the gas exploding in the gauze, and re-lighting the wick several times over. The Stephenson's lamp is the safest I am practically acquainted with, but in this the gauze is a source of weakness and danger. It will be clear to all when gas explodes it also expands with great rapidity and force, and the lamp being put into fire-damp the gas fills in through the gauze round the glass cylinder. It depends on the mixture and the conditions of the lamp whether the gas is exploded outside the gauze by the rapid expansion of the explosion inside, for flame can be forced through several thicknesses of gauze if the power be sufficient to do it. Another danger in the Stephenson lamp is the gauze being too short and not covering over the air holes, or being split at the bottom by forcing up the brush to clean them, or being nipped too tight at the bottom and forcing them from the rim, as miners are always obliged to carry them through straight and confined places with their hand tightly round the bottom of the gauze, or the quick velocity of air would put them out, then wires becoming displaced or broken endanger the lamps. All these, simple as they are, make the lamps nothing more than naked lights. Two of these lamps that I experimented on exploded in my hands, and the others were split at the bottom. This led to a further examination on the others and I venture to say that out of every hundred of these lamps ten explode if put under experiment, and one in ten thousand is sufficient to cause a fearful disaster. The evil of splitting the gauze exists in all lamps when they become old and tender. But it will be clear that a faulty lamp is not needed to cause an explosion. A few years ago a workman went to examine his working place previous to commencing work with a Stephenson's lamp when the gas exploded at the lamp; when it was examined it showed that short guage existed. Still, further, a few facts will show how easily these lamps and the screw locks are tampered with. The first that ever I saw, a man got his lamp to his mouth and held the bolt with his teeth whilst he turned it round, took the top off, and lit his tobacco. Another threw up the glass cylinder of the Stephenson lamp and sucked the blaze through the gauze, and lit his pipe, and many times at the Clanny and Davy, as this could could be easily done by putting up the blaze and sucking it through the top or sides of the gauze. But there is no difficulty in unlocking these lamps, for anything will do. False keys, nails with a nick filed in to fit the square of the bolt; a bit of wire bent in the shape of tongues, and held together; small bits of wood lapped with wire, small nails, pick points, &c. All these I have witnessed in tampering with lamps. Few men are aware of the temptations there are for miners to unlock each other's lamps for the purpose of relighting them where naked lights are prohibited. When there are from eight to twelve men in a stall or working place, there are generally two spare lamps allowed for each place, but no one has any right to the use of these save the contractors. A man having his work by bargain, and getting his lamp out, has perhaps to go a mile or more to the bottom and send it up to be relighted; the lamp men will send it down when they think well. The engine-men are kind enough to run the cage in the bottom hard enough to put the lamps out for a few times, and when told of it make sport of same. I have known men to be away from their work for a hour and a half, and experienced it myself. For it was seldom that a lamp could be had to go with, and I was obliged to either go in the dark or wait till the ganger came in. This would throw men about one shilling and sixpence out of their wages. I have known this evil to exist to such an extent that it was a common practice to unlock and light each other's lamps, and men getting their lamps out would even put others out so that all might be concerned in the secret. The first time I worked with lamps, after six or eight months I found two wires broken in my gauze. I was pleased enough to instruct the lamp-man of this danger, who said the gauze was wore quite thin. This resulted in a shilling fine out of my pay. Men have even worked with wires broken and displaced for a long time, as they knew well when they were found out a shilling fine would be the result, whatever might be the cause. I hope it will not be thought that these evils are a lot of concocted theories merely got up for this purpose, but they are facts that can be proved. And one false step in a thousand is sufficient to terminate in a dreadful dissaster. I do not wish it to be understood that I am trying to bring any contempt on the inventors and improvers of safety lamps, for I would rather bare my head and bow with reverence to a statue of these men than to the greatest warrior that lived.

Being practically acquainted with mining and the use of safety lamps, no one has seen the need of a better lamp and lock than myself, and my feelings were aroused on this subject of a better lamp after seeing the dreadful reports of explosions in the year 1878, and I have tried in every possible way to overcome every evil as far as my inventive powers will allow, so as to present to the mining world a thorough safety lamp, one that will meet every requirement of the miner and one that cannot be tampered with. Although it may seem very simple in its construction, merely substituting one thing for another, yet the simplest thing about it has cost me the most time and trouble. Nearly everything in the lamp I arrived at a month before my patent was entered. The locking of the lamp has to me been most difficult to arrive at.

The construction of my lamp is as follows: I secure a metallic dome, consisting of a cylinder or cylinders, shell, or shells, and as heretofore a gauze. In the dome is secured above the glass an iron, or other metallic tube, having a copper perforated cap, over which is fitted a gauze cap, through which the heated air readily escapes, and passes out through the ventilating boxes at the top of the dome. The gallery beneath is secured to the dome by pillars, in which is fitted the glass, secured with a gauze drum or ferrol fitted to face the air-holes in the hollow rim in the gallery through which the air passes to feed the flame. The reservoir is screwed and fitted perfectly safe in the neck of the gallery. A small tube is inserted in the reservoir, through which moves the pricker for raising and lowering the wick in a flat or round tube. For the locking of the lamp I secure a cylinder inside the vessel, in which is fitted a piston having a rod or bolt passing through and projecting above the rim on side vessel, which is held up by a spring on the principle of a cornet valve. When the top is secured on, the bolt is held up by the spring into the recess in the neck of the gallery, which is prepared to receive it, and thus held perfectly safe. In the bottom of the cylinder is a hollow-threaded screw, studded on the inside, so that it cannot be taken out, and a button or stud on the outside, rivetted or brazed, with a hole bored into the screw, which being screwed up carries the air-hole to inside the lamp. For unlocking the lamp I secure a pump with two valves on the pneumatic principle, worked with a lever or otherwise. The hollow screw being released a little allows the air-hole to be accessible, same being tightly held into an elastic-faced cup connected to the pump, which exhausting the air from the cylinder allows the piston to bring down the bolt on the spring lower than the recess, allowing the lamp to be screwed off for cleaning, replenishing, &c.

The advantages I claim for the lamp are as follows:—It is a good light. The blaze cannot be drawn or propelled through the lamp. It cannot be exploded in any mixture or velocity. The flame never leaves the wick to pass into the dome. It is sensitive to gas. It extinguishes itself instantly when contacted with gas. It will stand a greater current of air. It cannot be tampered with nor unlocked without the apparatus. The lock is self-acting. The economy is a great consideration in cleaning and repairs. The shield I have prepared gives a great advantage to miners' eyesight. It will perhaps not be out of place to say my first experiments on this invention was to ventilate the lamps with small tubes, and to runaway from the principle of the gauze altogether, seeing that all inventors had, more or less, followed in the footsteps of Sir Humphry Davy. But finding this to be very bulky and difficult to manufacture, I struck out the idea, and worked with as little depth of gauze as possible. Seeing by experiment that gas levels itself round the gauze to the same depth as inside, and the gas exploding expands at a rapid rate, and passes the flame to the outside; I next tried to secure a better light at less cost by burning parafin and the application of a half-inch flat wick, and to do away with a pricker, securing the wick with a spring or ratch-wheel, so that miners could not tamper with the flame. This I arranged very satisfactorily, and secured a good light that would burn twelve hours without being altered, with cotton-wool inside the vessel so that the liquor would not squirt out to smear the lamp, But everyone that I consulted that was experienced in the science of chemistry condemned the use of parafin or any other mineral oil, and expressed a great surprise that inspectors allowed its use. I tried some experiments with it, and was satisfied with its use even where the temperature varies and reaches over 70 degrees Fahrenheit.

My next experiment was to lock it with springs and ratch wheels. I was some time in tonguing these, but found I could not get strong springs in a small compass, and found many ways to lock it, but none to unlock it without others doing the same. I next proceeded to unlock it with blockwork, as all my locks were arranged self-acting. I so completed it as to go twelve hours before it could be opened. Finding this rather complicated also, a lamp going out after being lit half an hour would have to be laid aside for eleven and a half hours before it could be opened for relighting. This threw me again into difficulty. I next commenced to work with a thin column of mercury, heating the lamp to a high temperature, so that the mercury would raise a float and release the spring to unlock the lamp. I relied on this for some weeks, but afterwards found that boys, or even men, might get a number of lamps together, and obtain the heat required, and thus open the lamps. But my present lock and apparatus have resulted from these experiments with mercury. I may say that should the lock prove a failure from any cause, I have other means of altering it and considerably increasing its strength, but slower in the movement.

I hope it will not be thought that I have been too lengthy on this all-important subject of reducing the death-rate of British workmen, and showing a few simple facts on the construction of our globe, the skilful work of the atmosphere, the deadly mixture of gases that flow in streams through our mines when liberated, the dreadful scene of an explosion, the destruction and ruin, the need of good ventilation, the danger of the gauze lamps, the need of a better, and the advantages of my invention; and if I can only be the means of saving one of my fellow-workmen from the flames of an explosion, one from being dashed to atoms, one widow from bereavement, one mother from grief, one child from the pangs of hunger, one sister from the temptations of vice, one employer from ruin—I shall have done some little good, and accomplished that which I have laboured for; thus carrying out the highest purpose of my being. When my talent shall be required, my life may be crowned with the words of my Maker, "Thou hast been faithful over a few things, I will make thee ruler over many."

THE DIAMOND QUESTION.—In answer to Messrs. Jonas Bros., Mr. Hannay wrote to the *Times*, of March 1:—"Dear Sirs,—I do not in the least expect any discovery will have any effect upon your business, as the cost of producing very small quantities of substances like boart, is so great as to relegate the process to a mere laboratory experiment.—I am, &c.,—J. B. HANNAY.

Mr. Charles A. Righter, of New York city, has invented an improved card for use in putting up buttons for market. It is so made that several different styles of buttons may be attached to the same card in such a way that all or any desired part of either style may be detached without interfering with either of the others.

An improvement in apparatus for filling capsules, patented by Mr. Franklin E. Davenport, of Auburn, Ind., consists in a funnel, tube, and plunger. The funnel is flattened at one side to assist in taking up the material. The tube is adapted to receive the capsule, and is bevelled at its end to aid in placing the same, and the plunger is fitted with an elastic collar, which prevents it from being forced too far into the tube.

Mr. James Kerr, of Church, County of Lancaster, England, has patented an improvement in apparatus for guiding and delivering woven fabrics to cloth finishing machines. It consists in a peculiar arrangement of two conical rollers, by means of which every deviation of the fabric to the right hand or the left causes a deflection of a frame and brings into operation devices which arrest or retard one of the rollers, thus bringing the fabric back automatically to its central position.

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